

GainTRAC™

Environmental Control System

VENTRA™

Environmental Control System

Operation Manual

PM-099-002G 5.03 August 25, 2006

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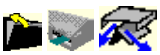
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AS WITH ANY SOPHISTICATED CONTROL SYSTEM, THIS CONTROLLER CANNOT BE GUARANTEED TO PERFORM WITHOUT INCIDENT FOREVER. THERE ARE MANY CONDITIONS SUCH AS LIGHTNING STRIKES, PROGRAMMING ERRORS, AND EQUIPMENT FAILURE THAT COULD RESULT IN THIS CONTROLLER FAILING TO PERFORM ITS INTENDED FUNCTION. YOU MUST BE AWARE OF THIS AND BE WILLING TO TAKE THE NECESSARY PRECAUTIONS TO PREVENT FINANCIAL LOSS.

TO PROTECT AGAINST LOSS RELATED TO THE FAILURE OR MALFUNCTION OF THIS CONTROLLER, THE FOLLOWING SAFEGUARDS ARE REQUIRED:

1. A MANUAL BACKUP SYSTEM MUST BE INSTALLED. THIS SYSTEM MUST TAKE OVER IN THE EVENT OF A CONTROL SYSTEM MALFUNCTION.

2. AN ALARM SYSTEM MUST BE INSTALLED. THIS SYSTEM MUST PROVIDE A VISUAL INDICATION AND AUDIBLE WARNING OF ABNORMAL CONDITIONS.

3. A WEEKLY TEST OF THE MANUAL BACKUP SYSTEM AND ALARM SYSTEM MUST BE PERFORMED. THIS TEST CONFIRMS THAT THESE SYSTEMS ARE FUNCTIONING PROPERLY.

4. A DAILY CHECK OF THE CONTROL SYSTEM MUST BE PERFORMED. THIS CHECK CONFIRMS THAT THE SYSTEM IS OPERATING PROPERLY.

5. NON-FUNCTIONAL ALARM OR BACKUP SYSTEM COMPONENTS MUST BE REPAIRED IMMEDIATELY.

Overview

Ventra's advanced microprocessor-based design has made it possible to regulate the environments of livestock facilities with far greater precision than conventional thermostats and timers. It provides a consistent climate for your animals, resulting in better feed efficiency, better growth, and lower mortality.

The Ventra achieves this by carefully monitoring temperature, air speed, humidity, static pressure, feed use and water use. These "inputs" are used to determine when to turn fans on and off, when to open and close air inlets, when to turn on tunnel ventilation, and much more. Using the controller's keypad, you will input operating parameters for each device group, desired building temperature (which can be adjusted automatically over time), and conditional decisions such as at what humidity level should fogging/misting be disabled.

About this Manual

This manual is written for use with a variety of controller software programs. The programs are similar in most ways, but there are unique items pertaining to hogs or birds. Some of the information in this manual may not pertain to your specific application (brooders, for example, may not pertain to controllers designed for hog operations).



The hog symbol appears next to text that only applies to controllers operating the hog controller software. The birds symbol appears next to text that only applies to controllers operating the bird controller software.

HotKeys



HotKey technology™ provides direct access to current temperatures, history, settings and setup - the four most commonly used menu selections. Some controllers also have HotKeys for animal information and input/output tests. A symbol similar to the one shown at left appears next to information about HotKeys. If the controller doesn't have HotKeys, you can still navigate to those menus using the arrow keys on the keypad.

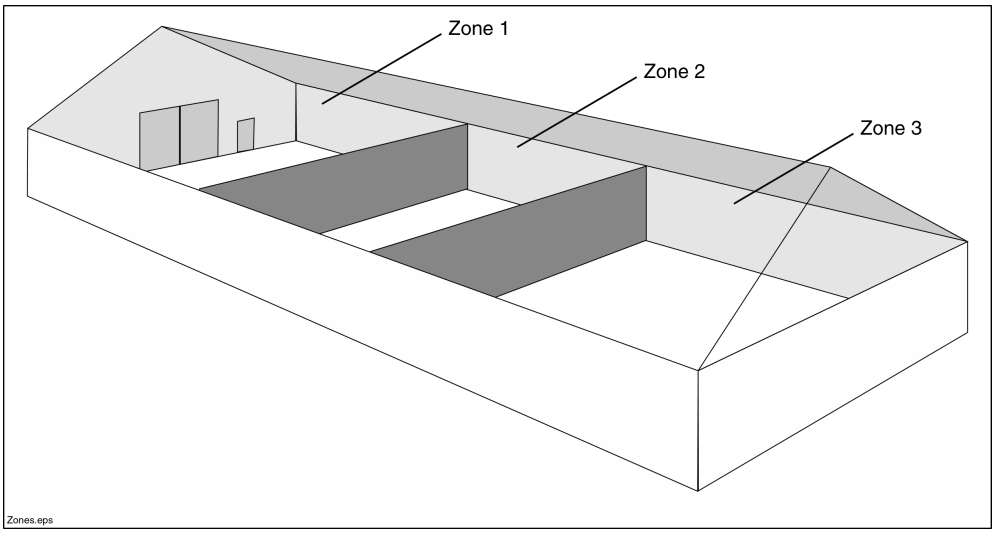
Effective Environmental Temperature (EET)

All 16 and 32 channel controllers, and all multi-zone-capable controllers have the EET™ feature. EET takes into account the effect that air movement has on how comfortable an animal feels (requires an air temp/speed sensor such as Air Sensor Model 935 and an EET-capable controller).

Zones



Controllers with a Zone key have multiple zone capability. This lets you specify different environmental conditions in individual rooms or areas. When two or more zones are set up, the controller can act like two or more separate controllers.



There are a few rules that pertain to multiple zones:

- Output channels cannot be assigned to more than one zone.
- Sensors cannot be assigned to more than one zone. Zoning isolates sensors in each zone. For example zone 1 cannot read or average sensor readings from an inside temperature sensor in zone 2.



The zones symbol appears next to text that only applies to controllers with multi-zone capability.

Attention Symbols

You will find two symbols commonly used throughout this manual.



This symbol appears in sidebar text that addresses commonly missed steps that can cause minor problems or confusion.



This symbol means the text has extra significance since it is describing the importance of a feature or explaining a step to which you should pay close attention to avoid problems.

Troubleshooting

If you experience problems, refer to the *Troubleshooting* section in the *Installation Manual*.

Ventilation Modes

You'll need to be familiar with several ventilation terms used in this manual.

Natural

Natural ventilation is simply opening a building to allow outside breezes to flow through. This is usually accomplished by lowering curtains. Natural ventilation is ideal when the temperature outside is close to the temperature the animals need. The air exchange rate depends greatly on outside winds.

Power Ventilation

When natural ventilation isn't adequate to keep the building cool enough, sidewall fans are used in conjunction with curtains or other inlets to increase the air exchange and bring more fresh outside air into the building.



The controller menus combine natural and power ventilation into one mode called "natural" to differentiate this mode from tunnel mode.

Minimum Ventilation

Minimum ventilation is the process of bringing outside air into a building even when the indoor temperature and humidity do not require it. This helps keep ammonia, dust and carbon dioxide from accumulating.

Purge

Purging is the process of evacuating stale contaminated air and replacing it with fresh air. This is necessary when a building is closed up for a long time, as during cold weather. Purging is initiated when humidity reaches a level and a length of time you set. Purging will not occur if curtains are open. Any combination of fans and air inlets can be set up to purge.

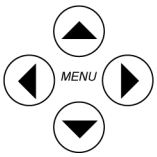
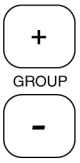
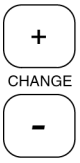
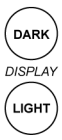
Tunnel

Tunnel mode uses air inlets or curtains located at one end of the building and tunnel fans at the other end to transform the building into a wind tunnel. This creates a wind chill effect for the animals. Tunnel mode is often used in warm climates where natural/power ventilation cannot adequately cool the animals.

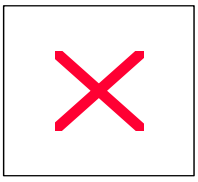
Entering & Exiting Tunnel Mode

While entering and exiting tunnel mode, the tunnel curtains are moving to or from their tunnel positions. During this time, if all the tunnel fans are turned on, the curtains may not be able to move because of the suction generated by these fans. It is recommended that a limited number of fan groups be designated as ENTRY/EXIT fans to reduce this effect.

Key Pad

Keys	Function
	HotKey for accessing control parameter setup such as the temperature setpoint. You can edit these values.
	HotKey for accessing the current environmental conditions including temperature and humidity. These values can be viewed.
	HotKey for accessing system & control device set-up. You can enter the date and time in this menu and add or edit input and output devices.
	HotKey for accessing historical data of equipment run times and environmental conditions such as average temperature.
	HotKey for accessing animal information such as current age and weight.
	HotKey for accessing various input and output tests including a test of the alarm output relay.
	Used for navigation. Press the UP or DOWN arrow to move vertically through menu screens. Press the LEFT or RIGHT arrow to move to the top screen of an adjacent menu category.
	When you see a menu item that includes a group number such as “Air Sensor #1” press the GROUP PLUS and MINUS keys to quickly move to the same menu item for other installed groups such as “Air Sensor #2.” Most controller models do not have these keys. The group keys appear only on non-plus 16 and 32 channel controllers.
	When you need to change a value or group number in a menu item, press the PLUS and MINUS keys.
	Use this to cancel the current menu and move back to a previous menu or an opening screen. Pressing CANCEL twice always returns you to the starting menu.
	Selects the zone to be viewed or modified. Pressing ZONE cycles between all zones. This key appears only on multi-zone-capable controllers.
	Press ENTER to edit a menu item’s value and to confirm changes.
	Use this to change the contrast of the 80-character display. If the display is blank when you turn the unit on, press and hold the DARK button to increase the contrast to the desired level.

Controller Switches and Hot Keys



Channel Output Toggle Switches

Each equipment group is assigned to an output channel. Some devices with independent open and close circuits, such as curtains, require two output channels. In those cases, the two output channels should be interlocked. Refer to the *Channel Interlocking* section in the *Installation Manual* for more information.

The three-position toggle switches allow you to manually control devices connected to each output channel. The status light next to a channel illuminates when that channel is on.

On/Off

Set the switch to ON or OFF to override the controller. You can use this switch to test an equipment group, turn off equipment, or override the controller for any reason. The controller will not let you turn on a channel if it is interlocked to a channel that is already on.

Auto

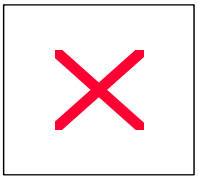
Set the toggle switch to AUTO to allow the controller to manage the environment. Before selecting AUTO, input your settings in the Device/Equipment Settings menu. Make certain the settings in this menu are properly configured.



Channel Hot Keys

Each output channel's label uses HotKey technology. Pressing a HotKey takes you directly to the display for that channel's settings. HotKeys are not available on some controllers.

~~Controller Switches and Hot Keys~~



~~Channel Output Toggle Switches~~

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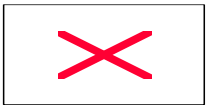
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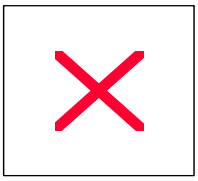
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Planning



In order to set up a building to be operated by the controller you must:

- List the devices (fans, curtains, heaters, lights, misters, etc.) that are in the facility.
- Plan how each type of device will be grouped (turned on and off together).
- Determine optimum sensor locations.
- Determine which sensors will control each equipment group.
- Determine which controller output channel each equipment group will be connected to.
- Determine which controller input channel each sensor will be connected to.
- Determine the desired operational settings such as on/off temperature settings for each heating and cooling group, etc. Input these settings into the controller.
- After you have documented, and *thoroughly* understand the set up information, you can begin programming the controller. The *System & Control Device Setup* section of this manual describes the process of programming the controller.

Daily Usage - Check These!

You should review a few parameters on a daily basis.

- **Alarms** - Check the controller display to make sure there are no active alarms. If there are active alarms, you must clear them (press the ENTER key) to turn off the alarm relay. Go to the Alarm History menu to find information on alarms and errors. As the animals grow, adjust the water usage and feeder run time ON/OFF alarm settings as necessary.
- **Current Environmental Conditions** - Observe that the animals appear comfortable. Check the temperature and humidity. You should also check these in the History menu to see what the conditions were during the previous night/day.
- **Setpoint** - Verify the temperature setpoint (Temperature Control Setting menu) is correct. If you are not using the temperature setpoint ramping feature, adjust the setpoint manually as the animals grow and their temperature requirements change.
- **Equipment Status** - Check the water use and feeder run times. You should also check the status of other equipment.
- **Backup Thermostats** - Adjust and test backup thermostats regularly to match changes in the setpoint temperature. Improperly adjusted thermostats may start devices when you don't want them to or they will not provide effective backup when needed.



If an active alarm condition is detected and no keys have been pressed for 60 seconds or more, the Alarm History menu is automatically displayed.

Brood/Growout



When you move from Brood to Growout1, or from Growout1 to Growout2, remember to change the House Control Mode menu item (see the Temperature Control Settings menu).

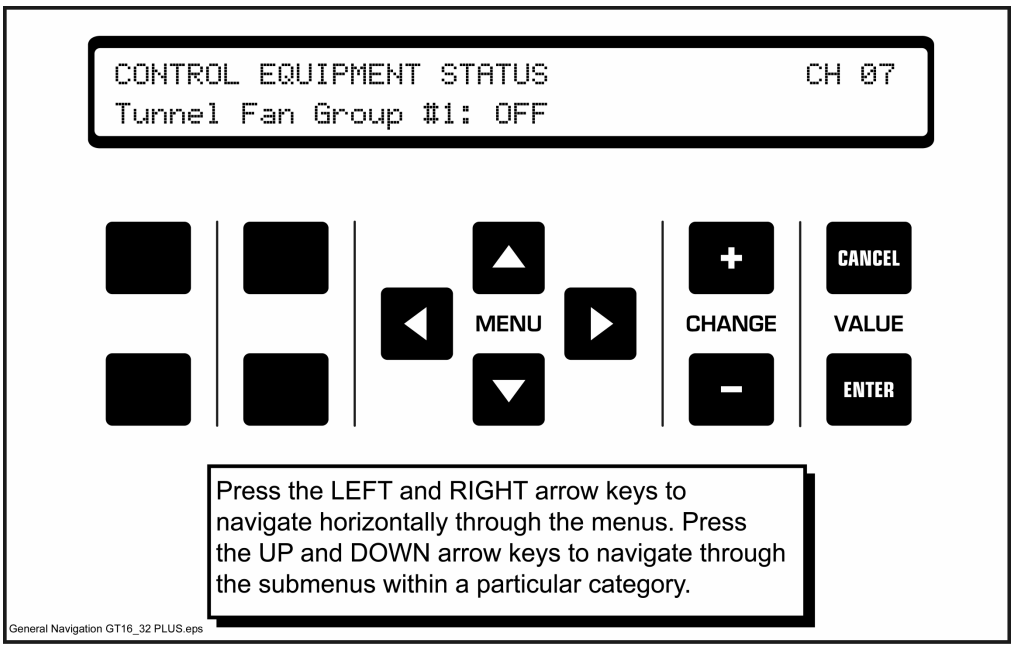
Survival Mode

In the rare event that all temperature sensors in a zone fail, or an entire input/output board fails, the controller follows a set of operating rules and activates attached alarm devices.

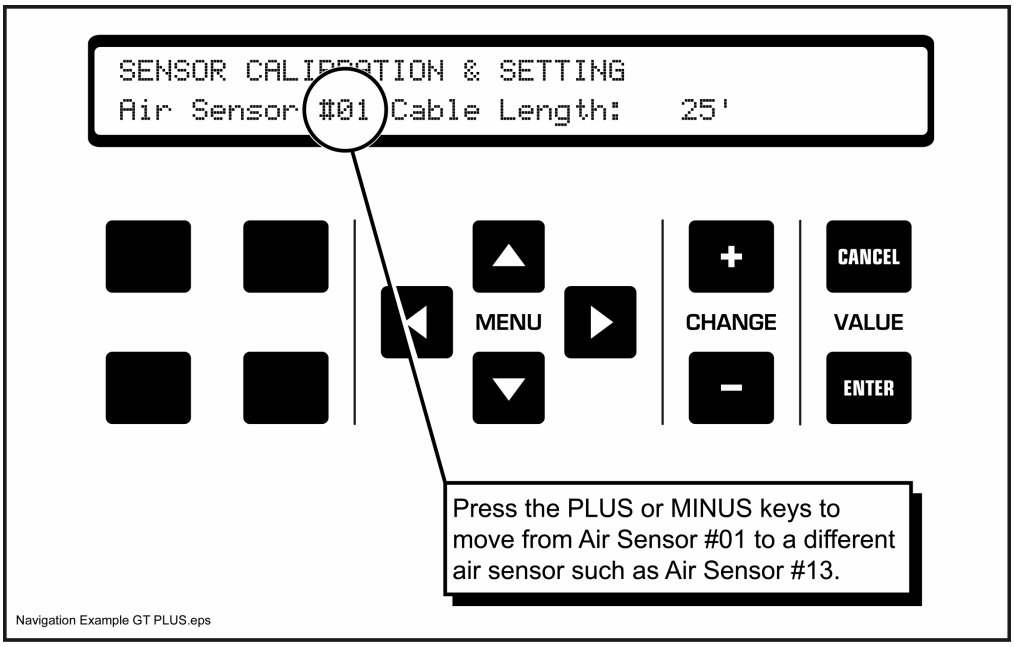
- The last valid temperature reading continues to be used.
- Curtains and inlets stay in their current position.
- If the current ventilation mode is Entering Tunnel, the controller will continue into Tunnel mode.
- Purge cycles will continue.
- Furnaces and Heaters are turned off.
- Brooders continue to run based on the last valid temperature reading.
- Other devices run based on timed settings and/or last valid temperature.

Menus and Navigation

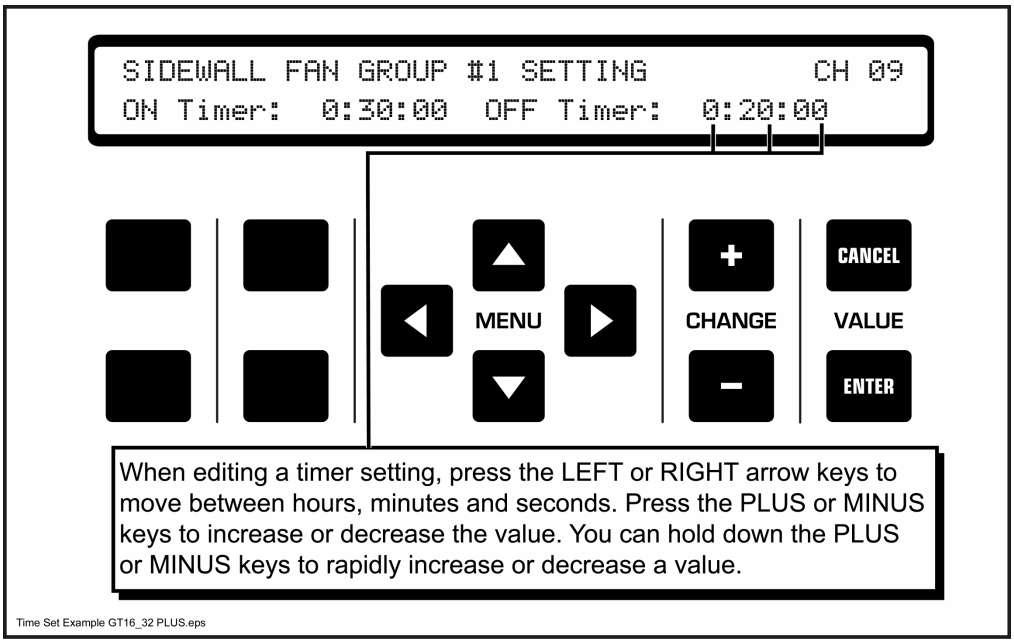
The following pages describe each of the menus found on the controller. The navigation keys allow you to scroll through the major menu categories.



In some instances, you will need to press the PLUS and MINUS keys to move between similarly named devices.



You can quickly edit timers by using the RIGHT and LEFT arrow keys to switch between hours, minutes and seconds.



Device-related menu items will not appear unless you install the associated equipment.

First Time Use - Global Parameters

The controller software is designed for hog or bird applications, Metric or American measurement units and Fahrenheit or Celsius temperatures. The first time the controller is powered on, you are prompted for preferences.



These preferences cannot be changed once you start installing devices (fans, inlets, etc. If you need to change these preferences, uninstall all of the devices to reset the controller to a "new" state.

Hogs or Birds

Select whether the controller will be used in a hog or bird application.

```
GLOBAL PARAMETERS SETUP
Animal Type: Birds
```

Length / Weight / Measurement

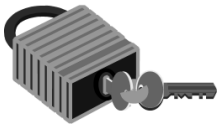
Select the preferred unit of measurement.

```
Units of Measure: Inch/Pound/Gallon
```

Temperature Measurement

Select the preferred temperature measurement.

```
Temperature Measure: Fahrenheit
```



Software & Security

Power Up Sequence

When the controller is powered on, a copyright screen is displayed.

```
COPYRIGHT (C) 1995 - 2001
BLUE EARTH, MANKATO, MN, USA
```

After approximately 30 seconds, the opening screen is displayed.



Press the DOWN or UP arrow key to navigate to menu items within a menu group.

Opening Screen

The opening screen displays the controller's date, time, and software revision number. If the controller goes without power for a week or longer, or if you recently changed the controller's memory card, verify the time and date. The time and date are set under the System and Control Device Set-Up menu.

```
CONTROLLER (Date) (Time)
Software Revision Number: BEB5.00
```

Revision – Date/Time

This screen displays the software's revision date and time.

```
Revision Date/Time: (Date) (Time)
```

Control Center Serial Number

This is a unique identifier assigned to the controller. Record this number and have it available in the event you need to call for service. You will also need this number to access the controller from a remote PC.

```
Control Center Serial Number: XXXXXXXXX
```

Enter Password

Ventra controllers are shipped without a password, so there are few restrictions on what can be viewed or edited. You can use the EDIT PASSWORD menu (described later) to create a password.

```
Enter Password: 0000 Security Level:
```

1. Press ENTER.
2. Press the PLUS or MINUS key to change the first digit to match your password.
3. Press the RIGHT arrow key to move to the next digit.
4. Repeat steps 2 and 3 until the password is correct.
5. When the cursor is under the last digit, press ENTER and your security level will appear. Wait for a few seconds for the controller to accept the password.

Security remains at the level entered for one hour after the last key is pressed. To reset the security level to 0 after you are finished, enter a password of 0000 and press ENTER.

Edit Password

Up to 10 different passwords can be set up. Password codes and security levels may be changed or deleted at any time.

```
Edit Password #X: 0000 Security Level: X
```



You must have level 3 or 4 security access to edit passwords.

1. At the Edit Password menu, choose the password you want to edit using the PLUS or MINUS keys.
2. Press ENTER.
3. Change the password digits using the PLUS or MINUS keys. Press the RIGHT arrow key to move to the next digit.

   To DELETE a password, change it to 0000. Be sure there is a level 3 or 4 password left, or no password, or you will be locked out of the controller.
4. Repeat step 3 until the password is correct.
5. When the cursor is under the last digit, press ENTER to confirm the password.
6. Use the PLUS and MINUS keys to select a security level for this password.
7. Press ENTER to confirm the password and security level.

Security Levels

0 This is the most secure level. Level 0 users cannot change parameters or settings.

1 User can change Current Animal information, time & date, feeder timers and light timers.

2 User can change all parameters except for adding, deleting and changing control devices and passwords.

3 User is allowed to make any changes. Level 3 is required to view Error Detail menus.

4 Service code for technician or a user single-day code available from manufacturer.

Watchdog Address Display Table

This is used by factory personnel only. This menu item will not appear if you have set up passwords for the controller.

Compile Options

This menu item provides a quick look at the controller's configuration. It is useful for troubleshooting over the phone with a service technician. It is not important to know what the code shown after Compile Options signifies.

```
Compile Options: EBCYNNYNBF
```

This menu item will only appear for users with a password security level of 3 or when no passwords and security levels have been set up.



Current Environmental Conditions

Average Actual Temperature

This is an average of all indoor air sensors. If the controller detects erroneous sensor readings it does not use them to calculate the average temperature. Sensor readings outside the temperature range of 30 degrees to 130 degrees Fahrenheit or -1.1 to 54.4 degrees Celsius are ignored.

```
Avg Actual Temperature:  74.0
```



If you use the Effective Environmental Temperature feature, you must:

- Enter Animal Age

- Enter Animal Weight

- Enter Projected Age

- Enter Projected Weight

- Use Air Speed/Temp Sensors

- Clean Sensors Weekly

Average Actual - Effective Temp

This reading is based on the **actual/effective** mix set in the Temperature Control Settings menu. **Effective** takes into account the effect that air speed has on how comfortable an animal feels (requires an air temp/speed sensor such as Air Sensor Model 935 and an EET-capable controller).

```
Avg Actual-*-Effective Temp:  74.0
```

Sensor Temperatures

The controller displays current temperatures for up to 12 indoor sensors (this may require up to three screens to display). Press the DOWN arrow key to view additional sensor temperatures. The sensor number shown on the screen is the first sensor in the listing (if the number is #1, the temperatures are for sensors one, two, three and four). A series of dashes indicates a sensor is not installed. N/A is displayed for any sensor with an invalid reading.

```
Sensor Temps: #1  74.5  74.2  75.0  ----
```

Outside Temperature

This is the reading from the outside temperature sensor. Outside temperatures from - 60 degrees to 130 degrees Fahrenheit or - 51.1 degrees to 54.4 degrees Celsius are considered valid.

```
Outside Temp:  74.0
```

Air Speed

Because air speed is measured using a resistive thermal sensor, high accuracy should not be expected. The objective is to determine the overall effect air speed has on the animal's comfort level. The air speed shown is averaged over several minutes. Multiple readings are listed the same as the sensor temperatures. OFF indicates the air speed capability for a sensor has been turned off (refer to the *Air Sensor Settings* section later in this document) and a series of dashes indicates the sensor is not installed. N/A is displayed for any sensor with an invalid reading. This menu item requires an air temp/speed sensor such as Air Sensor Model 935 and an EET-capable controller.

```
Avg Air MPH: #1   1.5   1.9   OFF   ---
```

Relative Humidity

This menu item is displayed only if there is a relative humidity sensor installed. Humidity can be difficult to accurately measure, especially in a confinement building environment where the air is generally contaminated. Factory fresh sensors are typically accurate to plus or minus 5 percent. Long-term accuracy depends greatly on the level of impurities in the air.

```
Relative Humidity:  45%
```

Static Pressure

This menu item is displayed only if there is a static pressure sensor installed. The Ramping OFF status indicates the temperature is beyond the low or high end of the ramp table or that you have not set a ramp table. ON indicates the static pressure setpoint is adjusted based on the ramp table. Refer to the *Temperature Control Settings* section for static pressure ramping information.

```
Static Press: 0.040" water (Ramping OFF)
```

Ventilation Mode

Devices operate differently in different modes, so knowing the ventilation mode helps you understand what the controller is doing. Seven possible modes can be displayed:

- **Natural Temp** – The building is currently using devices designated as *natural* (natural, power, or minimum ventilation). All tunnel-only and purge-only devices should be off or closed.
- **Entering Purge** – The building is transitioning into purge mode. Non-purge curtains, inlets and fans are closing or turning off. Purge curtains and inlets are opening to the specified purge opening size.
- **Purging** – All non-purge devices are off or closed and purge devices are running or open to the specified purge opening size. The building remains in this mode for the duration specified under the Building Purge Setting menu.
- **Exiting Purge** – The building is transitioning out of purge mode. All devices designated as *purge* are closing or turned off.
- **Entering Tunnel** – The building is transitioning into tunnel mode. Non-tunnel inlets, curtains and fans are closing or turning off.
- **Tunnel** – The building is in tunnel cooling mode. All devices designated as *natural only* are off or closed. Only devices designated as *tunnel* are enabled.
- **Exiting Tunnel** – The building is transitioning from tunnel mode back to natural. All devices designated as *tunnel* are closing or turning off and *natural* devices are enabled.

```
Ventilation Mode: Tunnel
```



Animal Stress Index

The Animal Stress Index provides an indication of your animals' comfort level. It takes into account the combined effects of air temperature, air speed, floor type, animal weight and animal age. The four responses are:

- Not Stressed
- Alert
- Danger
- Emergency



If the animal age or weight is set to zero, the stress index will not be displayed.

```
Animal Stress Index: Not Stressed
```



Device menu items such as Furnace Group will not appear unless you install the associated equipment.

Control Equipment Status

The Control Equipment Status menu shows the status of the ventilation equipment in the building. The screens are automatically updated as the status changes. Use the UP and DOWN arrow keys to scroll through the available menu items in this category. Use the PLUS and MINUS keys to scroll through the device group numbers within each menu item (device type). Menu items for devices and equipment not installed are not shown.

Any device that has an ON/OFF status menu, may also have (SW ON) or (SW OFF) on the menu when the manual override switch is in a position that contradicts the expected on/off status. This applies to **12-channel controllers** only!

Brooders / Furnaces / Heaters

The current ON/OFF status of an individual furnace group is shown (brooder and heater are similar).

```
Furnace Group #1: OFF
```

Fans

Fixed speed fan groups can only be OFF or ON. Variable speed fan groups can be OFF or ON at power settings that range from 1 (minimum) to 60 (full on).



Variable speed fans require a controller model with variable speed channels or the ability to communicate with a variable speed expansion station.

```
Sidewall Fan Group #1: OFF
Tunnel Fan Group #2: OFF
Vari-Side Fan Group #3: OFF
Vari-Side Fan Group #1: ON at 22 of 60
```

In House Fog, Cool Pads and Misters

In house fog, cool pad and mister operation is controlled using temperature and one of four variable duty cycle timers. The example below shows in house fog group number two is currently controlled by duty cycle timer four.

```
In House Fog Group #2, Duty Cycle 4: ON
```

Curtains, Ridge Vents and Inlets

Device motor run times (or position sensors if installed) are used to calculate the current opening size of curtains and inlets.

```
Side Curtain #1 Open:  17"
Sidewall Inlet #2 Open:   2"
Tunnel Inlet #2 Open:   0"
```



Feeder run times are determined by monitoring feed sensors. If there are no installed feeders (output channels) then the controller monitors the feed sensors all the time. If there is a feeder installed, the controller only monitors the corresponding feed sensor when the feeder channel is ON. ***Feed Sensor #1 is related to Feeder #1. Be sure each feeder sensor has the same group number of any feeders it monitors.***

Equipment Timers

The ON/OFF status menu items for the various timers used to control lights and feeders is shown below.

```
Lights Group #1: OFF
Feeder Group #1: ON
```

The 24-hour feeder run times are in hrs:min format. The times are taken from the three most recent 24-hour periods in the historical data (excluding the current hour). The most recent 24-hour total is displayed as the left-most data.

```
24Hr. Feeder#1 Run: 12:30,  9:00,  11:22
```

Press the PLUS or MINUS keys to change the feeder group number.

Run time is totaled for each feeder (days, hours, minutes and seconds). If more than one feeder sensor installed, press the PLUS and MINUS keys to scroll through the feeder group numbers. Press ENTER while viewing the total to reset it to zero. Press the LEFT arrow key to confirm the reset action.

```
Feeder #9 Total Run Time:  10  10:46:50
```

Digital Alarm Group

This menu item displays the current status of the digital alarm sensors. ON indicates that the sensor is in a state that could trigger an alarm (depending on how you have set up the digital alarm). Press the PLUS or MINUS keys to change sensor numbers if you have more than one installed.

```
Digital Alarm Group #1:  OFF
```

Water Use

The amount of water used in the three most recent 24-hour periods for Water Meter #1 (excluding the current hour) is shown in the menu below. Press the PLUS or MINUS keys to change the water meter group number.

```
24Hr. Water#1 Used:  5000,  3125,  3094
```

The Total Gallons Used for each water meter is displayed. If more than one water meter sensor is installed, press the PLUS or MINUS keys to scroll through the water meter group numbers. Press ENTER while viewing the total to reset it to zero. Press the LEFT arrow key to confirm the reset action.

```
Water #1 Total Gallons Used: 123456
```



Current Animal Information

Weight Gain Progress

The controller tracks animal age and weight. However, you must input the initial age and weight at the start of a production cycle. Each day **at midnight**, the age is incremented by one and a new weight is calculated. You must input the projected finishing age and weight for this calculation to work properly. The temperature ramping feature uses the animal age value. Some stress index calculations (if the controller supports stress index) use the age and weight values.

```
Today's Age:   35 Days  Weight   2.0
Finish Age:    90 Days  Weight   6.0
```

Head Count Information

The head count numbers are for your record keeping.

```
Beginning Head Count: 10000
Total Mortality Head Count:    10
Total Sold Head Count:     0
```

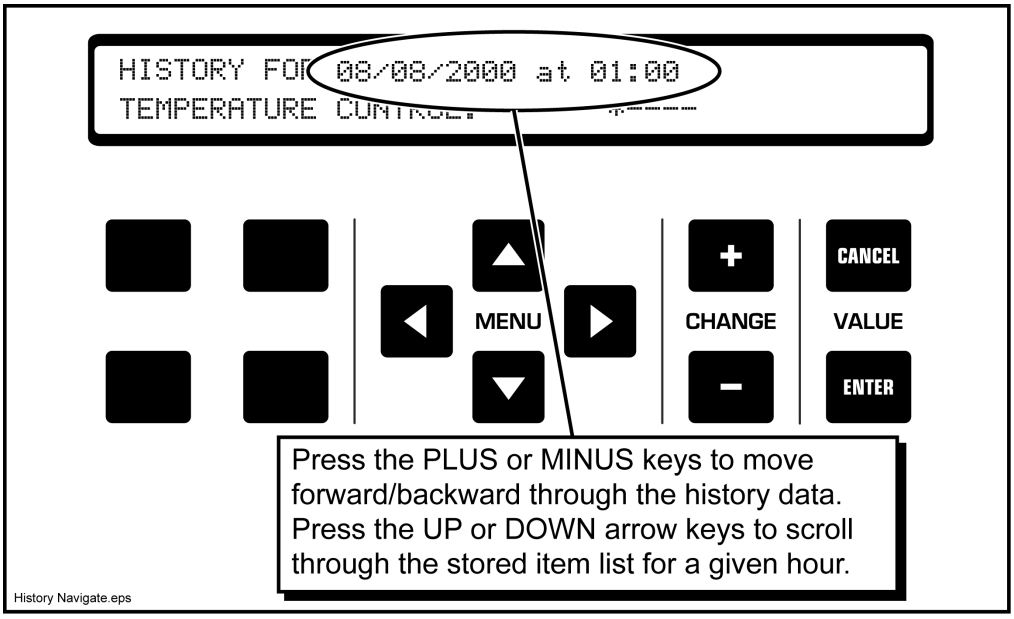


Warning: Setting the Beginning Head Count to 0 forces the temperature control mode *OFF*. It also *disables* most alarms.



History

The controller tracks operating conditions and equipment status. This information is totaled or averaged for each one-hour period and then saved to memory.



History storage capacity depends on the number of devices that are installed. When the memory storage is almost full, the oldest records are overwritten to make room for the new history.



The optional Link Software package is a great way to download history data from the controller and display it on a PC in table or chart format.

Environmental Conditions

These menu items display the measured environmental conditions including temperature, air speed and humidity. The setpoint temperature is recorded once per hour. The average temperature calculation uses actual, effective, or a percentage of effective temperature depending on the Temperature Control Mode. With the Temperature Control Mode set to OFF, actual temperature is used. The number of purges initiated during each hour is also recorded.






```
Temperature Control: ----*------
House Control Mode: Brood
Setpoint Temperature:  71.0
Avg Temperature:  70.8
Zone Avg Temperature:  70.8
High/Low Temps (actual):  72.6/ 67.3
Avg Air Speed (MPH):    2.1
Avg Outside Temp:  65.5
Avg Humidity:  46%
```

Static Pressure

When a static pressure sensor is installed, static pressure information is stored. Refer to the *Static Pressure Setting* section later in this manual for more information.

```
Static Pressure Setpoint: 0.050
High/Low Static Pressure: 0.060/ 0.040
```

Purge Cycles

The controller records the number of purge cycles each hour.

```
Purge Cycles (Humidity/Timed)  0/  2
```



Stress Index

The animal stress index provides an indication of your animals' comfort level. It takes into account the combined effects of air temperature, air speed, floor type, animal age and animal weight. These menu items are displayed only when there is information to report (stress minutes is greater than zero).

```
Minutes at "ALERT" Stress Index:  23
Minutes at "DANGER" Stress Index:  17
Minutes at "EMERGENCY" Stress Index:   8
```

On Times

The controller saves historical information for all devices except lights. The listed times are in minutes and seconds for a given hour.

```
Sidewall Fan Grp #1 ON Time: 30:00
```

12-channel controllers have the ability to record actual on time as well as the time a device should have been on. The time listed next to C is the time a device should have operated according to the controller's settings. The time listed next to A is the actual time a device operated. If the C and A times are different, the channel switch was probably not on Auto during the time period.

```
Furnace# 1                C-30:00 A-30:00
Sidewall Fan #1           C-30:00 A-30:00
```

Opening Sizes

The controller saves historical opening size information for curtains, inlets, ridge vents and chimney dampers. The number of inches open is a running average for the hour.

```
Sidewall Inlet #1 Avg Open:  11”
```

For 12-channel controllers, the time listed next to O is the time spent opening and the time listed next to C is the time spent closing. These are actual times rather than the times expected according to the controller’s settings.

```
Sidewall Inlet #1 Actual O-21:00 C-21:00
```

Water Use

The amount of water consumed is often used as an indicator of animal health.

```
Water Meter #1 Gallons Used: 120
```

System Restart

Every time the controller performs a power-up restart, the System Restart incident counter for that hour is incremented by one. A restart may occur as a result of a power loss, system reset, or watchdog reset. This is a troubleshooting aid.

```
System Restart Incidents:   1
```



Temperature Control Settings

The controller makes many decisions based on temperature. The temperature Control Settings menu allows you to input preferences for temperature-related decisions. Be sure to complete these menu items before setting up specific devices (fans, heaters, etc.). The information entered here, especially temperature setpoint, impacts most installed devices.



You should determine what your temperature setpoint will be before inputting or editing individual temperature settings for control devices.

Temperature Setpoint

This is your target building temperature. The controller calculates the on and off temperatures for devices based on the current temperature setpoint. When you change the setpoint, the individual temperature settings for all the installed devices also change.

Set the Temp Setpoint manually or have the temperature ramping feature automatically adjust it every day at midnight. If the animal age is within the age settings in the temperature setpoint ramp table (explained later), ramping is ON. When ramping is ON, the setpoint may NOT be manually adjusted. Temperature settings for control devices (fans, heaters, etc.) automatically track along with temperature setpoint changes.

```
Temp Setpoint:  71.0        (Ramping ON)
```

Controlling Building Temperature: Actual or Effective

Actual or effective temperature, or a blend of the two, can be used to control the building environment. This is called the *working* temperature. The controller uses the working temperature to determine when to turn devices on and off. The Temp Control can also be set to OFF.

Effective takes into account the effect that air speed has on how comfortable the animal feels. ***Actual*** uses the actual air temperature only.

Model 935

When setting the temperature control, use the PLUS or MINUS keys to move the asterisk (*) right or left, or to select the OFF mode (the asterisk is replaced by the word OFF). Moving the asterisk to the right increases the amount of effective temperature used to calculate the working temperature. If you are not using an air speed/temp sensor such as Air Sensor Model 935, move the asterisk fully toward Actual.

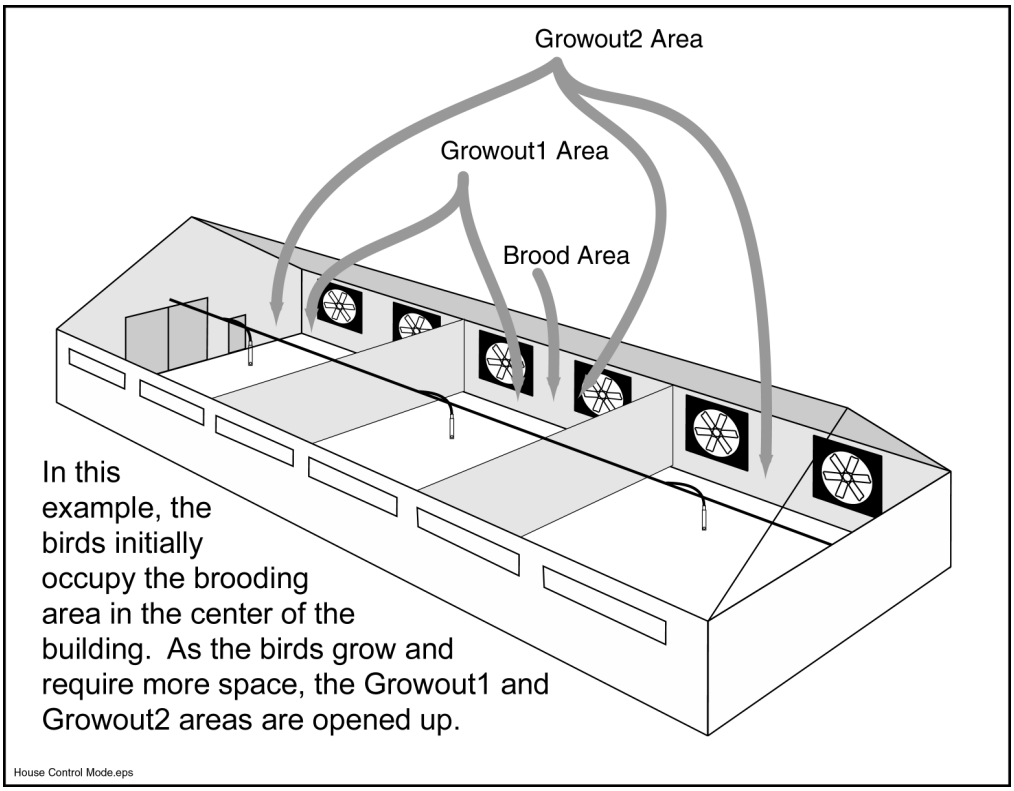
```
Temp Control: Actual ----*------ Eff.
```

Non-EET-capable controllers have two options: OFF or ACTUAL.

The OFF mode causes the controller to turn off all temperature controlled output devices and disable the normal alarms. Changing Temp Control to OFF also sets the Beginning Head Count (Current Animal Information menu) to zero. The controller still continues to read inputs and store history. This mode is designed to conserve energy costs when the building is empty.

House Control Mode

This determines which sensors are used for calculating the *working* temperature. The working temperature is used to determine when devices should be turned on or off. Most producers designate a section of their building for Brood. All of the air sensors in that area of the building are then Brood sensors. Refer to the *Air Sensor Settings* section for information about specifying the location of an air sensor. The rest of the building can be one or two more sections; Growout1 and Growout2.



When the House Control Mode is Brood, only sensors in the Brood area are used by the controller.

```
House Control Mode: Brood
```

Interlocking

You can interlock devices together so that the operation of one device affects the operation of another device. These menu items only appear when the related devices are installed.

To enable interlocking, set Ridge to Curtains and/or Heater to Curtains to INTERLOCK.

```
Ridge to Curtains: INTERLOCK
Heater to Curtains: NO INTERLOCK
```

When interlocking is enabled, a menu is added to the Ridge and Heater/Brooder/Furnace menus that allows you to specify the curtain groups to interlock with the device.

Interlocking ridge vents to curtains can enhance air quality in the building while maintaining good temperature control. When ridge vents are interlocked, their open or close settings are ignored. All ridge vents open the same number of inches as the interlocked curtain having the largest opening size. For example, the maximum curtain opening size is 48 inches and the maximum ridge opening size is 10 inches. As the curtains open the ridge will also open, tracking the curtain in that zone that is open the most. As soon as any curtain in the group is 10 inches open, all ridges in that zone will be fully open (this example assumes that ALL curtain groups are interlocked).

When interlocking is enabled for a heater (or furnace or brooder), and the controller detects that the heater's ON temperature has been reached, the heater will not turn on if the interlocked curtains are open more than about one inch or centimeter. The word "Curtains" in the Interlock menu items also includes ridge vents. Only the word Curtain appears due to the limited display size.

Refer to the *Ridge Vent Settings* and the *Furnace, Heater and Brooder Settings* sections for more information.

Tunnel Settings

You can set up the temperatures for entering and exiting tunnel mode. Tunnel mode takes over when the working temperature reaches the tunnel entry temperature. For example, you may be running sidewall fans to keep the building temperature below 80 degrees. But on a hot day, this might not be enough to keep the temperature below 80 degrees, so tunnel mode begins at 83 degrees to create a wind chill effect for the animals.

The controller follows these steps when tunnel mode starts:

- Cool fans stop. Only the fans designated for tunnel mode run.
- Purge and minimum ventilation times are overridden and cease to function until the building returns to natural mode.
- Natural inlets and curtains close completely. Tunnel inlets and curtains then open.
- If you stage the tunnel fans on at different temperatures (set each fan's ON Temp setting), inlets will open wider proportionally to the number of fan groups running.

The following menu items appear only when a tunnel fan is installed.

```
ENTER Tunnel Temperature:  83.0
EXIT Tunnel Temperature:  80.0
```

Input the minimum time the building must remain in tunnel mode. This prevents the ventilation system from going out of tunnel mode too quickly. However, the controller overrides the minimum time if the working temperature drops to the setpoint. Don't set the minimum time too long since it is possible the temperature could fall to the EXIT Tunnel Temperature and turn off the fans before the minimum time expires leaving you with no ventilation.

```
Remain in Tunnel Time:  0:05:00
```

Refer to Appendix A for an example of staging tunnel groups.

Temperature Ramping

You can automatically adjust the building temperature to the animals' needs by creating a ramp table with appropriate temperature values and ages. The animal age used here is the same animal age used within the Current Animal Information menu.

```
Today's Age:    5 Days
Ramp Point #1 Age:  10   Temp  80.0
```

A ramp point is an age at which you want the building (or zone) to be at a specific temperature. Set a series of ramp points, up to 12, to adjust temperature over a growing cycle. Press the PLUS or MINUS keys when the Ramp Point menu is displayed to change the ramp point number.

Each day at midnight, the controller scans the ramp table and a new temperature setpoint is determined and substituted for yesterday's setpoint. The controller selects the setpoint temperature based on the ramp point ages and temperatures. For in-between ages and temperatures, the controller calculates an appropriate setpoint temperature (see graph below). This allows subtle temperature changes from day to day.

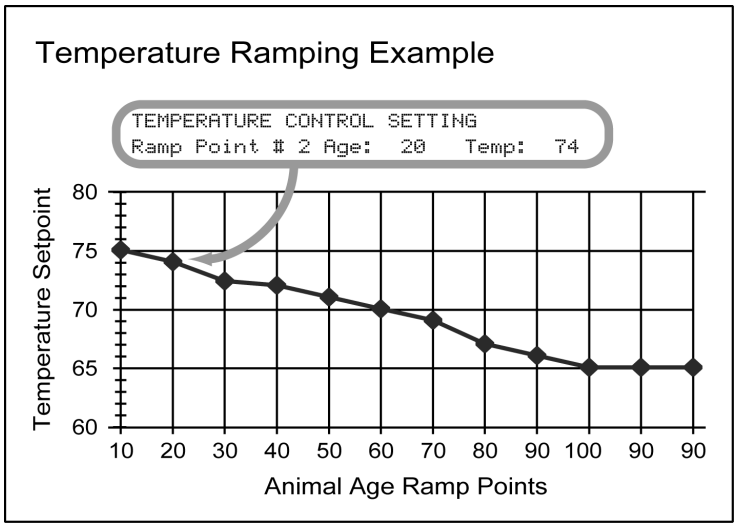
If you enter a Temperature Ramp Offset, it is added (or subtracted) from the temperature determined by the ramp table. This allows you to temporarily adjust a ramp table without reentering all the values.

```
Temperature Ramp Offset:  +1.0
```



You can also adjust all ramp point temperature values by editing the Temperature Ramp Offset value, and then holding the ENTER key for several seconds. After the values have been updated, the Temperature Ramp Offset value will be 0. You must manually readjust temperatures to return the ramp table to the previous values.

The graph illustrates how up to 12 ramp points might be configured.



Notice in the graph how the temperature ramps smoothly between ramp point ages. Also note how the temperature stays constant at 65 degrees beyond the age of 100. The reason is the age for Ramp Point 11 is a descending value (100 days down to 90 days) which disables further ramping.

Floor Type



The floor type of the building (or zone) contributes to the calculated effective temperature. It should be set to CONCRETE for all concrete slab surfaces and OTHER for all other floor types.

```
Floor Type: CONCRETE
```

Curtain Temperature Inhibit

Set an outside temperature at which all natural curtains in the building (or zone for multi-zone controllers) are not allowed to open. This menu only appears if at least one fan capable of providing minimum ventilation and an outside temperature sensor are installed. The curtain inhibit does not affect purge cycles, static pressure controlled curtains, or tunnel mode curtains. When the temperature rises to at least one degree higher than this setting, normal operation resumes. Enter -60 to have the controller ignore this setting.

```
Close Curtains Below Outside Temp:  -10.0
```

This setting does not change when the setpoint temperature changes.

Building Purge and Minimum Ventilation Settings

Purging is the process of evacuating stale contaminated air and replacing it with fresh outside air. Any combination of fans and inlets can be set up to purge.

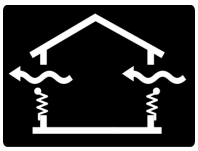
Minimum ventilation is the process of bringing outside air into a building even when the indoor temperature and humidity do not require it. This helps keep ammonia, dust and carbon dioxide from accumulating. When outside temperatures are cold, minimum ventilation may be necessary even though you are also heating the building.

You will see one of two menus depending on how the building is set up:

- Building Purge Setting menu - If no fans, or only stir fans are installed, the controller assumes you are running a simple **natural-ventilated building** and displays the Building Purge Setting menu.
- Minimum Ventilation and Purge Settings menu - If fans (other than stir fans) are installed, then the controller assumes you are running a **power-ventilated building** and displays the Minimum Ventilation and Purge Settings menu.



The humidity-related menu items shown below appear only when a humidity sensor is installed.



Natural Ventilation: Building Purge Setting Menu

If you are running a natural-ventilated building, the Building Purge Setting menu is displayed.

Conditions for Purging

A purge cycle can be triggered by the Purge Delay timer or by the Humidity Delay timer. The purge cycle runs for the time specified by either the Purge Time ON or the Humidity Purge ON depending on which delay timer triggered the purge cycle. The two possible purge conditions are:

- All curtains and ridge vents have been fully closed for the duration specified by the Purge Delay timer. Air inlets are not considered to be curtains when checking for all curtain devices closed. Or,
- All curtains and ridge vents have been fully closed and the humidity level has been continuously at or above the Humidity Purge Setpoint for the duration specified by the Humidity Delay timer.

Normally the Humidity Delay timer would be set for less time than the Purge Delay timer so that under high humidity conditions a purge cycle would take place more frequently. The default Humidity Setpoint of 100% disables the humidity purge.

When a purge occurs in a natural-ventilated building, the curtains and inlets open to the Purge Opening Size that you entered for each device group.



The rule that having pit fans means a building is "power ventilated" may cause a problem for growers who use only pit fans and curtains. The Purge Time ON menu item is not available for power ventilated buildings. The solution is to install the Pit Fans as Stir Fans so that the Purge Time ON menu item is available.

Purge Time On and Delay Time

The Purge Time ON determines how long the building will purge when triggered by the Purge Delay timer. The Purge Delay timer is the length of time the building must be continuously closed before starting a purge.

```
Purge Time ON:  0:10:00  Delay:  1:00:00
```

Humidity Purge Setpoint

If the building is closed and the humidity rises above this setting for the length of the Humidity Delay timer, a purge is initiated. If the humidity sensor gives a bad reading, humidity purges will not occur, but timed purges will occur.

```
Humidity Purge Setpoint: 90%
```

Humidity Purge On Time and Delay Time

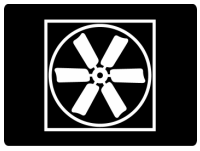
The Humidity Purge ON time determines how long the building will purge when triggered by the Humidity Purge Setpoint and Humidity Delay timer. The Humidity Delay timer is the length of time the building must be continuously closed and humidity at or above the Humidity Purge Setpoint before starting a purge based on humidity.

```
Humidity Purge ON: 0:10:00 Delay 0:50:00
```

High and Low Temperature Inhibit

If the working temperature falls below the Purge Inhibit Temp LOW setting, purging is inhibited. If the temperature falls below the Purge Inhibit Temp LOW setting while a purge is in progress, the purge is stopped. If the temperature rises above the Purge Inhibit Temp HIGH setting, purging is inhibited. If the temperature rises above the Purge Inhibit Temp HIGH setting while a purge is in progress, the purge is stopped.

```
Purge Inhibit Temp LOW: 60.0 HIGH: 95.0
```



Power Ventilation: Minimum Ventilation and Purge Settings Menu

If you are running a power-ventilated building, the Minimum Ventilation and Purge Settings menu is displayed.

When a purge occurs in a power-ventilated building, the curtains and inlets open to the Purge Opening Size for each device group. Fans that have Purge as a part of their operating mode are turned on.

Minimum Ventilation Timer

This is the ON and OFF times (minutes and seconds) used for fans designated as Temp or Minimum Vent when those fans are not running based on temperature. Minimum ventilation is important when a building purge is not triggered frequently enough to keep inside air fresh. Minimum ventilation runs inlets using their proportional settings or by static pressure control depending on how you've set up the inlet or curtain.

```
Minimum Vent Timer ON:  5:00 OFF:  5:00
```

Humidity Purge Setpoint

If the humidity remains at or above this setting for the length of the Humidity Delay Timer, a purge is initiated.

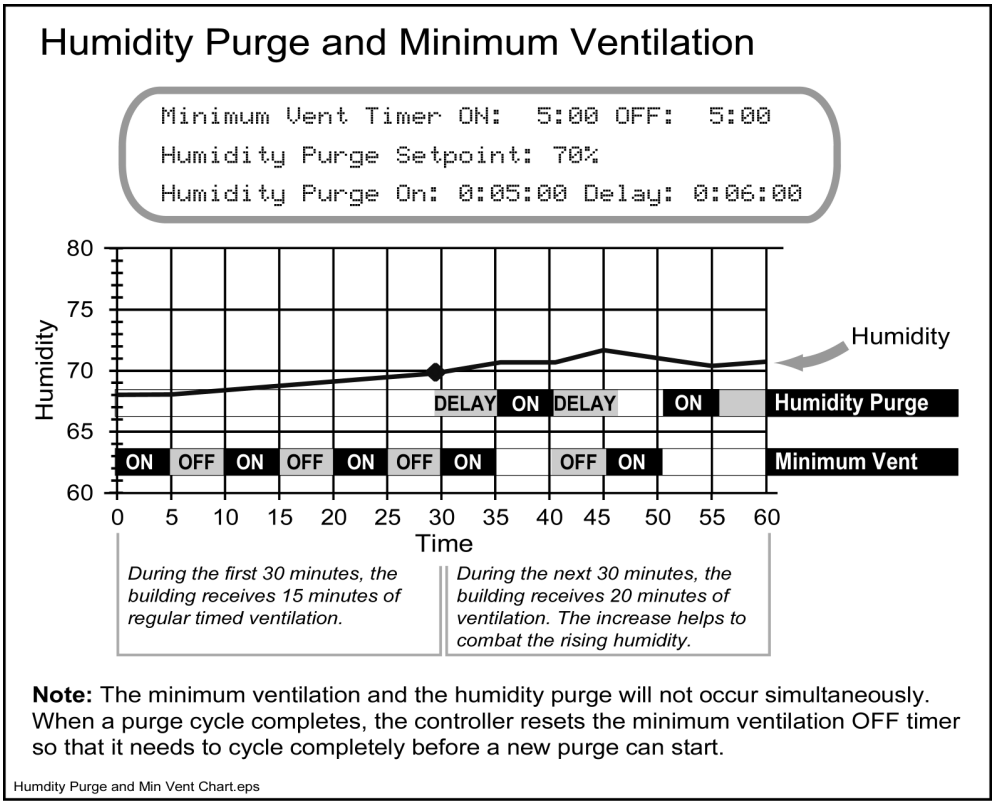
```
Humidity Purge Setpoint: 90%
```

If you do not have any fans designated as Purge fans, the Humidity Purge Setpoint menu item does not appear.

Humidity Purge On Time and Delay Time

The Humidity Purge ON time determines how long the building will purge when triggered by the Humidity Purge Setpoint and Humidity Delay timer. The Humidity Delay timer is the length of time humidity must be at or above the Humidity Purge Setpoint before starting a purge based on humidity.

```
Humidity Purge ON: 0:10:00 Delay 1:00:00
```



We suggest setting the Humidity Purge Delay slightly longer than the minimum ventilation cycle. The Humidity Purge ON time should be similar to the Minimum Vent Timer ON. This approach increases the amount of ventilation the building receives as humidity increases.

If you do not have any fans designated as Purge fans, the menu item shown below is displayed.

```
Humidity Purge: NO Purge Fans Installed
```

High and Low Temperature Inhibit

If the working temperature falls below the Purge Inhibit Temp LOW setting, purging is inhibited (or stopped if a purge is in progress) If the temperature rises above the Purge Inhibit Temp HIGH setting, purging is inhibited (or stopped if a purge is in progress).

```
Purge Inhibit Temp LOW: 60.0 HIGH: 95.0
```



The minimum ventilation and the humidity purge cannot occur simultaneously. When a purge cycle completes, the controller resets the minimum ventilation OFF timer so that it needs to cycle completely before a new purge can start.

We recommend you set your HIGH Purge Inhibit Temp at the point you begin turning on fans based on temperature.

Static Pressure Setting

Using an optional static pressure sensor, the controller monitors the difference in air pressure between air outside the building and inside the building. Static pressure can be used to control inlet devices. As more fans turn on or off, the controller adjusts the inlet size to compensate for changes in static pressure.

Setpoint, Open and Close

Input the target static pressure. Then, input the pressure at which static-pressure-controlled inlets should close to increase the static pressure. The Close static pressure must be lower than the Setpoint static pressure. Finally, input the pressure at which inlets should open more. Open static pressure must be higher than the Setpoint static pressure.

```
Setpoint: 0.040 Close 0.030 Open 0.050
```

The static pressure sensor delivers a maximum reading of 0.250.

Static Pressure Ramping

You can create a static pressure ramp table to automatically change the static pressure settings (setpoint, close and open) based on *outside* temperatures.

An outside air sensor must be installed to use ramping.

```
Ramp #1 Temp:  30.0  Static Press: 0.070
```

Input up to three ramp points by using the PLUS or MINUS keys to change the ramp point number. After the ramp point number is displayed, press ENTER to move the cursor to the Temp field. Change the temperature to the desired setting using the PLUS or MINUS keys. Press ENTER again to move the cursor to the Static Pressure field. Change the static pressure to the desired setting using the PLUS or MINUS keys.

Consult your county extension agent or other specialist for the best use of static pressure control in your region.



The alarm system should be tested periodically to ensure proper operation.

Sound Alarm When…

Use the UP or DOWN keys to scroll through the available menu items in this category. Use the PLUS or MINUS keys to select the device groups when setting the feeder and water flow alarm settings.

Alarm Relay Operation

During normal operation the relay terminals labeled **C-NO** (in the controller) do not have continuity, and the terminals labeled **C-NC** have continuity. In the event of an alarm condition, the **C-NO** terminals make contact (complete a circuit), and the **C-NC** contacts open. The alarm relay is momentarily in an alarm state during controller power up and always in an alarm state during a power interruption.

There are user-adjustable alarm settings plus a number of factory-preset errors and alarms. To minimize nuisance alarms, all alarm conditions include a built-in time delay or the requirement for a repeat occurrence.

Fixed High Temperature Alarm

Input a fixed high temperature at which an alarm state should occur. Fixed means the setting doesn't change even when temperature ramping is set up. This setting is always compared to *actual* average temperature.

```
Fixed High Temp Exceeds:  92.0
```

High/Low Temperature Alarm

Input the high and low temperatures at which an alarm state should occur. These settings change when temperature ramping is set up. These temperature settings are always compared to *actual* average temperature

```
Temperature Above:  92.0  Below:  60.0
```

Feeder Alarm

Feeder motors can run up to nine times per day using the feeder timers. When enabled to run, and a feed sensor is installed, the feeder motor current can be checked to determine if the feeders are on (running) for too long or off for too long. Setting the alarm times to zero disables the time check. During the enabled time, the on/off time of a single period is continuously checked against the maximum values entered below.



If a feeder on time alarm is generated, that feeder is turned off until the alarm is cleared or the controller is reset. If a feeder off time alarm is generated, it is automatically cleared if the feeder is later determined to be running.

```
Feeder #1 ON Time Exceeds:  1:00:00

Feeder #1 OFF Time Exceeds:  5:00:00
```

Water Use Exceeds Alarm

This setting determines the flow rate in gallons per hour that, if exceeded for more than one minute, triggers an alarm. Setting the value to zero disables the flow check. If more than one water meter sensor is installed, press the PLUS and MINUS keys to scroll through the list of water meter sensors.

```
Water #1 GPH Flow Exceeds:   800
```

Water Flow Drop Alarm

Each hour, the number of gallons used for each water meter is totaled. The most recent 24-hour total for the water meter is compared to the previous 24-hour total. If the total has dropped by a percentage larger than your setting, an alarm is triggered. Setting the value to zero disables the flow check. The check is also disabled if both of the totals being compared are less than 10 gallons. If more than one water meter sensor is installed, press the PLUS and MINUS keys to scroll through the list of water meter sensors.

```
Water #1 24-Hr DROP  10%
```

Static Pressure Alarms

All static pressure settings are in inches of water. Times are in minutes and seconds. Low static pressure may indicate malfunctioning fans. Either the fan is not operating or it is not pushing air (possibly a bad belt or obstruction). High static pressure may indicate malfunctioning inlets or curtains.

The static pressure high limit is usually set to a level that represents danger to the building. The static pressure needs to stay above the level you set for the time period you set before the controller alarms.

```
Stat Pressure Stays Above: 0.140 for 0:30
```

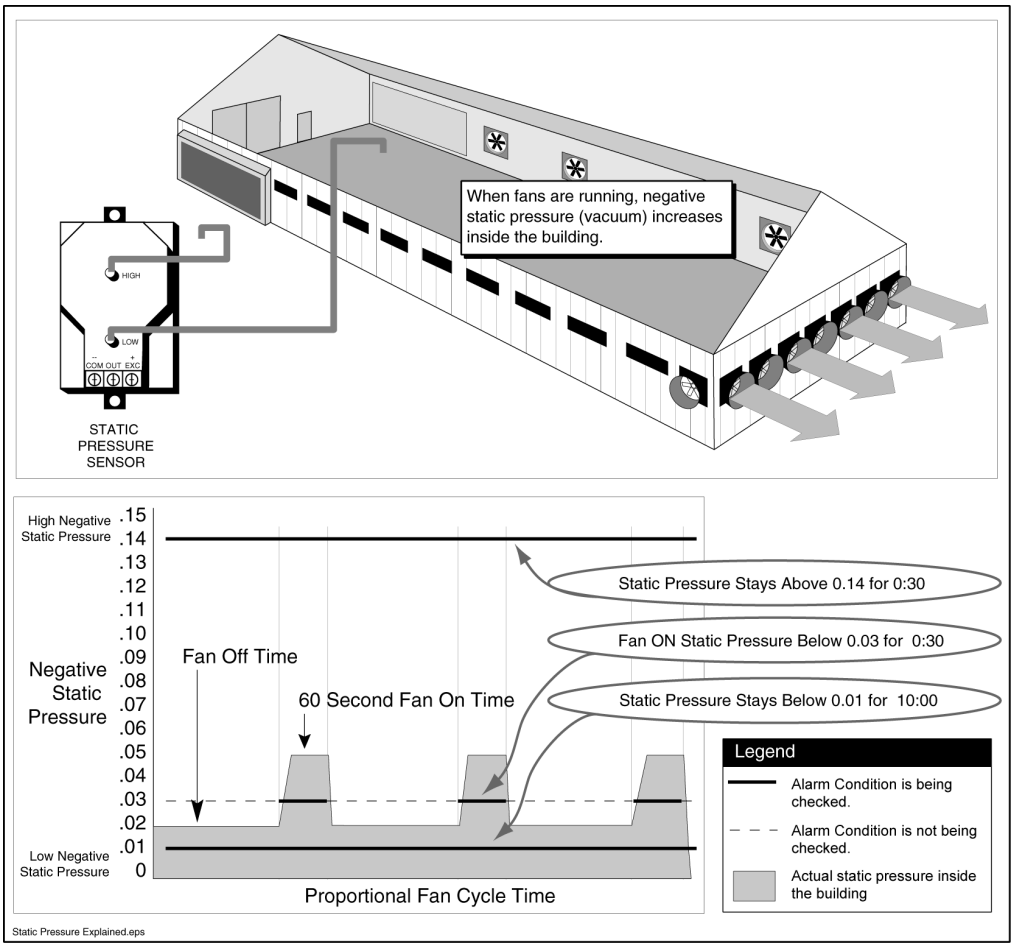
There are two types of static pressure low limit settings. The first type is constantly monitored. If this low limit is exceeded (falls below) for the time period you enter, the alarm is triggered. This is useful during minimum ventilation to ensure that fans are being turned on, and during tunnel operation when a drop in static pressure is intolerable.

```
Stat Press Stays Below: 0.010 for  10:00
```

The second type is checked only while one or more fans set as **proportional** are running. Set the static pressure alarms for a level that might indicate problems with fans or inlets. Also, enter a time that the condition must exist. However, be sure the time is less than the time the proportional fans run since the controller only checks for this static pressure alarm condition while proportional fans are running.

```
Fan ON Stat Press Below: 0.030 for  0:30
```

The following illustration provides an example of the possible static pressure alarm settings.



Humidity Sensor Reading is Invalid Alarm

When this menu item is set to YES, the controller alarms if the humidity sensor fails. The alarm requires the humidity sensor to give 10 invalid readings during a single hour to avoid false alarms. The humidity sensor is checked every 15 seconds, so a complete failure would cause an active alarm state in as little as 150 seconds. All invalid readings are recorded in the Alarm History.

This alarm setting is especially useful if you rely on the humidity sensor to trigger humidity-based purges or to enable and disable evaporative cooling devices.

```
Humidity Sensor Reading is Invalid: YES
```

Device/Equipment Settings



If no devices are installed, the Global Parameters menu also appears within Device Equipment Settings. Refer to the First Time Use section for an explanation of the global parameters.

From the Device/Equipment Settings menu, press ENTER to add, edit or view device settings.

```
DEVICE/EQUIPMENT SETTINGS
PRESS ENTER TO VIEW SETTINGS
```

Next, press the LEFT arrow key to go to the System & Control Device Setup menu. This allows you to install devices to get the controller up and running.

This manual is written for use with a variety of controllers. There are three main types of controllers and each requires a slightly different method for referencing inputs and outputs (relays). The differences are shown in the illustration below.

Menu Differences

16 and 32 Channel Controllers

Input devices are referenced by Input number. Output devices are referenced by Relay number.

```
LIST: Air Sensor              # 1
to Analog Sensor Input 01
```

```
LIST: Side Curtain            # 1
to Relay 01
```

12 Channel Controllers

Input and Output devices are referenced by Channel and Station number.

```
LIST: Air Sensor              # 1
to Channel 01 of Station 01
```

```
LIST: Side Curtain            # 1
to Channel 01 of Station 01
```

Modular Controllers

Input and Output devices are referenced by Channel and Module number.

```
LIST: Air Sensor              # 1
to Channel 01 of Module 01
```

```
LIST: Side Curtain            # 1
to Channel 01 of Module 01
```

Menu Differences.eps



System & Control Device Setup

This menu allows you to enter basic information such as date and time as well as adding control devices.



The controller does not update the clock for Daylight Savings Time because not all areas recognize this adjustment.

Date and Time Setup

Press ENTER to edit the current time (24-hour format) or the current date (month/day/year format for American and day/month/year for Metric).

```
Time Set-Up: (Time)
Date Set-Up: (Date)
```

Power Up Load Delay Time

Press ENTER to edit the power up load delay time. Use the PLUS or MINUS key to change the minutes and seconds. This prevents groups of fans and heaters from all starting at the same moment. Load delay time is designed to reduce the peak demand power requirements for your buildings and reduce the electrical load capacity for backup generators. The load delay time should be set just long enough to get a motor up to speed, about 2 to 5 seconds. The load delay time is only used for the first five minutes after a controller is powered on.

```
Power Up Load Delay Time: (Time)
```



Menu screens will not appear unless you install the associated equipment.

List Control Devices

Press ENTER at the LIST Control Devices menu to display a list of all the installed control devices.

```
Press ENTER to LIST Control Devices.
```

Use the PLUS or MINUS key to scroll through the list.

```
LIST: Air Sensor                # 1
to Analog Sensor Input 06
```



When adding devices to an expansion station, refer to the expansion station's instructions to set DIP switches so the controller can communicate with those devices.

Add a Control Device

Press ENTER when viewing the ADD menu to add a device.

```
Press ENTER to ADD a Control Device.
```

You are prompted with a control device name to add. Use the PLUS or MINUS keys to scroll through the list of possible devices. Use the LEFT or RIGHT arrow keys to move between fields. Use the PLUS or MINUS keys to change values in fields. Refer to the Menu Guide for a list of all device types.

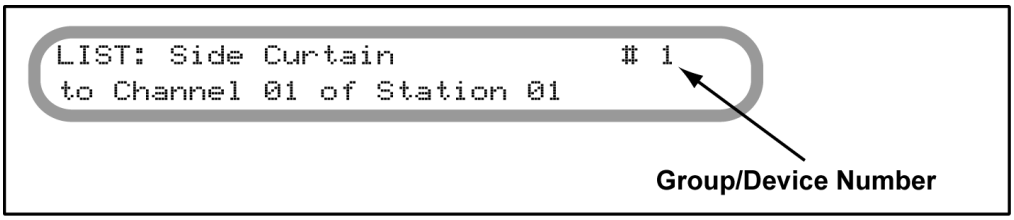
```
ADD: Air Sensor                 # 2
to Analog Sensor Input 01
```

Press the ENTER key twice to accept the new values.

```
ARE YOU SURE?  <ENTER> to confirm.
```

When adding a control device you must specify a group/device number. This is simply the number of the device you are adding. For example, if four air sensors are installed, they would be numbered 1 through 4.

Every input/output device type must be assigned a unique group/device number. For example, there can be only one #1 air sensor.



The outside air sensor is always #13, the humidity sensor is always #0 and the static pressure sensor is always #0. The channel number is the input terminal number in the case of sensors, or the output channel (relay) number for controlled devices.

When a device that has open/close capability is added, the controller automatically allocates the specified channel as open and the next output channel as the close channel (for example, channel 1 is open and channel 2 is close).

Add Device Errors

When adding devices, there are three errors that may occur:

- An attempt has been made to install a duplicate device.
- An attempt has been made to install a device to a duplicate station/channel number.
- An attempt has been made to add too many devices.

If one of these errors occurs, press CANCEL and try again with the correct information. Remember, some devices with open/close capability use two consecutive channels.

```
 Set-Up Error: Duplicate Device Found!
       Press CANCEL to continue.

Set-Up Error: Duplicate Station/Channel!
       Press CANCEL to continue.

      Set-Up Error: Cannot Add Device!
          Maximum Device Count is 90
```

Change Control Device

Press ENTER when viewing the CHANGE menu to change a device.

```
Press ENTER to CHANGE a Control Device.
```

This menu item allows you to change the assigned channel. If you want to change device-specific settings, go to the menu for that device (refer to the *Viewing, Entering or Changing Equipment Operation Parameters* section).

```
CHANGE:Air Sensor              # 1
to Analog Sensor Input 06          (ID 0)
```

To change a group/device number (#1 in the example above) DELETE the old device then ADD the new device.



Changing channels for two-channel devices, such as curtains, requires both of the new output channels to be unused.

Delete Control Device

Press ENTER when viewing the DELETE menu to remove a device.

```
Press ENTER to DELETE a Control Device.
```

You are prompted with a control device name to delete. Use the PLUS and MINUS keys to scroll through the available devices to delete.

Deleting a device that has open/close capability will free two output channels.

```
DELETE:Air Sensor              # 2
to Analog Sensor Input 06          (ID 0)

Press <***> to confirm deletion.
```

Confirm the deletion by pressing the LEFT arrow, RIGHT arrow and ENTER keys all at the same time.

```
DELETED!!!
```



Add Zone

Press ENTER when viewing the ADD New Zone menu to add a zone. You are prompted with the next available zone number and asked to press ENTER again to accept it.

```
Next available unused Zone number is 2.
Press ENTER to accept this Zone number.
```

Attempting to add zone 10 will result in the error message below.

```
     ** All 9 Zone numbers are used **
         New Zone cannot be added.
```



Delete Zone

Press ENTER when viewing the DELETE zone menu to remove a zone. You are prompted to confirm you want to delete the selected zone.

All devices must be deleted from a zone before the zone can be deleted.

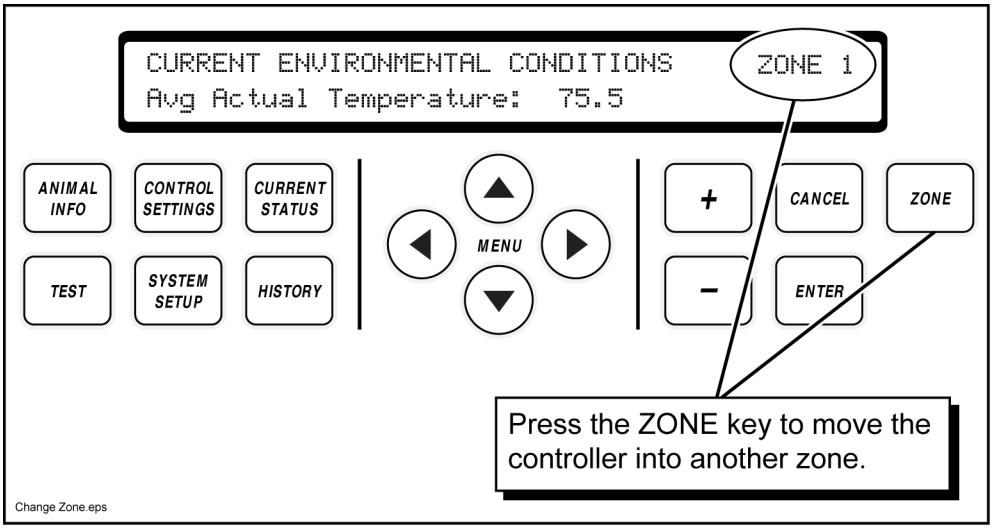
```
Press ENTER to DELETE Zone.

   DELETING Zone 2.    ARE YOU SURE?

Press <****> to confirm deletion.
```

Confirm the deletion by pressing the LEFT arrow, RIGHT arrow and ENTER keys all at the same time. Zone 1 cannot be deleted.

Zones



HotKey™ Technology

On HotKey-equipped controllers, the output channel labels are also hot keys. Pressing a channel label key will take you directly to the operating parameters menus for the related device.

Viewing, Entering or Changing Equipment Operating Parameters

Input operating parameters for the devices you have installed.

1. Go to the first menu screen in the Device/Equipment Settings menu (using the RIGHT or LEFT arrow keys) and press ENTER.

```
DEVICE EQUIPMENT SETTINGS
PRESS ENTER TO VIEW SETTINGS
```

2. Press the LEFT or RIGHT arrow key to scroll through the devices until you come to the device group you want to change.
3. Press the DOWN arrow key until the device setting you want to change is displayed.
4. Press ENTER to enter the EDIT mode. A "_" cursor will appear under the first data field.
5. Use the PLUS or MINUS keys to change the value.
6. Press ENTER to accept the setting and move to the next data field if there is one.

The following pages provide details for inputting parameters for each type of device.

The sensor menu items are grouped in the controller's Sensor Calibration & Setting menu. Refer to the accompanying *Menu Guide* for help in locating device menus and their menu items.

Sensor Assignment

This controller uses Shared Sensor Technology to control all the devices in the building. Any combination of sensors can be averaged to control any device. You may assign up to four sensors to each equipment group. Enter four zeros to assign all indoor temperature sensors to a group.

To change sensor numbers while you are setting up operating parameters for an output device (operating parameters are discussed later in this manual):

1. Press ENTER while you are viewing a menu item where sensors can be selected (usually displays Use Sensors).

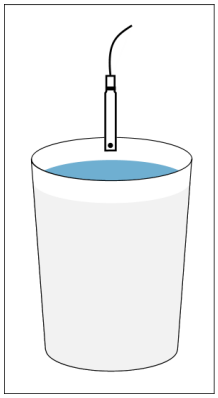
```
SIDEWALL FAN GROUP #1 SETTING
Use Sensors: ALL              (Avg 73.6)
```

2. Press the PLUS or MINUS keys to input the sensor number you want to have control the equipment group.
3. Press ENTER to confirm.
4. Repeat steps 2-3 for each sensor.

```
SIDEWALL FAN GROUP #1 SETTING
Use Sensors:  1,  2,  3,  4  (Avg 73.6)
```

5. If the cursor is still present, press ENTER until it disappears.
6. The average temperature of all controlling sensors is listed at the right.

Air Sensor Settings



Clean air sensors are essential to proper operation. Dip the air sensors into a cup of room temperature water and swish around. Do not bump the sensor on the side of the cup. Shake off the water droplets and leave to dry. The sensors read cooler during the cleaning process so only perform cleaning when the building is empty (or, temporarily turn off the controller). Verify the sensors are reading the correct temperature after they dry.

Cable Length

Input the length of cable connecting the air sensor to the controller. The air sensor is an analog resistive device so improper cable length settings can cause erroneous temperature readings. If you enter the proper cable length and still get an erroneous reading, you can essentially calibrate the sensor by adding or subtracting the cable length value entered here. Adding about 5 to 15 feet of length (the variance depends on the cable gauge) drops the air sensor's temperature reading by 0.1 degree Fahrenheit.

```
Air Sensor #01 Cable Length:   50'
```

Wire Gauge / Diameter

Input the gauge of the cable connecting the air sensor to the controller. The air sensor is an analog resistive device so improper cable gauge settings can cause erroneous temperature readings. Use shielded wire, 16 to 24 gauge (.5 to 1.2mm) stranded, such as Carol® AWM style 2426, to connect sensors to input channels.

```
Air Sensor #01 Wire Gauge: 24AWG
```

Location



Select the location of the air sensor. The location is important because the controller needs to know which sensors to use for the various house control mode settings (found in the Temperature Control Settings menu).

```
Air Sensor #01 Location: BROOD
```

Cal Values (EET-equipped controllers only)

If you are using an effective environmental temperature (EET) air sensor, input the calibration values printed on the sensor's tag. If no calibration values are available, use the default values that the controller displays.

```
Air #01 CAL Values: 550/ 90
```

Use for Wind Speed (EET-equipped controllers only)



If you are using an effective environmental temperature (EET) air sensor, and you want to factor air speed into the temperature calculation, set this menu item to YES. **If you are not using EET air sensors, this menu item must be set to NO.**

```
Air #01 Use for Wind Speed:  YES
```

Feeder Sensor Settings

The feeder sensor measures amps. The controller assumes the feeder is on when the measured current is above the minimum amps setting.

Minimum Amps

Input a value less than the minimum amps draw of the feeder. When the controller detects current higher than this value, it assumes the feeder is on. This menu also displays the current actual reading.

```
Feed #9 Minimum: 10.0A Actual: 11.1A
```

Cal Value

Unless otherwise specified in the feeder sensor's documentation, the calibration value is 100.

```
Feed #9 CAL Value: 100
```

Static Pressure Sensor Settings

ADC Cal 1 and ADC Cal 2

Input the ADC calibration values for the static pressure sensor.

```
Static Pressure ADC CAL 1:   6554
Static Pressure ADC CAL 2:  58982
```

WC Cal 1 and WC Cal 2

Input the Water Column calibration values for the static pressure sensor.

```
Static Pressure WC CAL 1: 0.000
Static Pressure WC CAL 2: 0.250
```

The values shown in these examples are the values typically used.

Specific static pressure control settings are entered in the Temperature Control Settings menus.

Humidity Sensor Settings

Cal Value

Input the calibration values shown on the tag attached to the humidity sensor. If no calibration values are available, use the default values shown below.

```
Humidity CAL 1 Value: 10485
Humidity CAL 2 Value: 51118
```

Water Meter Sensor Settings

Cal Value (PPG / PPL)

Input the pulses per gallon (PPG) or pulses per liter (PPL) calibration value for the water meter sensor. Unless otherwise specified, the value is 25.

```
Water #1 CAL Value (PPG): 25
```

Digital Alarm Sensor Settings

Digital alarms provide warnings of almost any emergency condition you need to be informed about. Any no-voltage circuit ("dry" contact) that can be switched will provide an alarm to the controller. The term "digital" refers to two possible states for a circuit: open and closed. Set up each digital alarm input to sense for an open or a closed circuit.

Trigger Alarm on Active Input

Set this to YES if you want the controller to alarm when the input is active.

```
Trigger alarm on Active input: YES
```

Input is Active When

Set this to CLOSED if you want the controller to alarm when the digital input circuit becomes closed. Set this to OPEN if you want the controller to alarm when the digital input circuit becomes open.

```
Input is Active when: CLOSED
```

Alarm Delay Time

Input the time (minutes and seconds) the alarm condition must exist before the alarm is triggered. For example, the controller should alarm when a door is left open. Set the Alarm Delay Time to 30 seconds to prevent a false alarm from normal building entry and exiting.

```
Alarm Delay Time:  0:30
```

Position Sensor

A position sensor is mainly used to verify the correct movement of a curtain, ridge vent, chimney damper or inlet that it is attached to. Its main purpose is to create an alarm situation if the reading from the position sensor does not match the attached device's calculated position from the controller.

A secondary benefit of the position sensor is the ability of the controller to use the position sensor reading to correct the attached device's position. After the inlet device has moved, if the calculated position and the position sensor reading do not match, the controller will move the inlet device again to correct the position. ALL of the following have to be true in order for the controller to use the position sensor in this way.

1. The position sensor has to be attached to a curtain, ridge vent, chimney damper or inlet.
2. The position sensor has to be calibrated so the device and position sensor settings match.
3. The "Enable Position Alarm" has to be set to YES.
4. The difference between the device's calculated position and the position sensor reading has to be within the percentage set in the "Percent OUT of Position to alarm" setting. (See User Manual Addendum at end of manual for 5.03 changes)
5. The device's calculated position and the position sensor reading have to be more than 3 seconds of travel time apart.

If ALL the above are true, then if the controller finds that the device's calculated position and the position sensor's reading are different, the controller will move the device again until the calculated position and position sensor reading match. If less than 3 seconds of travel time is required to make the position's match, the controller will not move the device again. If the positions are greater than the percentage to alarm, the controller will create an alarm and stop using the position sensor.



Two conditions will cause the position sensor to be completely ignored by the controller.

1. If the position sensor is in an alarm state.
2. If the "Enable Position Alarm" setting is set to NO.

~~A position sensor allows the controller to determine the opening size of a curtain, ridge vent, chimney damper or inlet.~~

Assign to a Device

Press the PLUS or MINUS keys to scroll through the list of installed curtains, inlets, ridge vents and chimneys. Press ENTER to assign the position sensor to the device it is attached to.

```
POSITION SENSOR #1 NOT CALIBRATED
Attached To: NO DEVICE
```

Calibrate

Before attempting to calibrate a position sensor, be sure:

- The curtain, ridge vent, chimney damper or inlet device is properly wired.

- The position sensor is properly wired to the controller.
- The curtain, ridge vent, chimney damper or inlet device is installed in the controller software.
- The Full Open Size menu item has been properly set for the device.
- The Full Open Travel Time menu item has been properly set for the device.
- The ON-OFF-AUTO switches for the device's open/close channels are set to AUTO.

Press the DOWN arrow key and then press ENTER when the menu item shown below is displayed.

```
Press Enter to calibrate this sensor
```

A reminder message to verify the device fully opens and closes is displayed. Press ENTER to proceed. An automated calibration process starts. Do not press any keys or move any switches during the calibration process. Press CANCEL to exit calibration.

1. The controller moves the device full open and then full closed.
2. The controller displays the close time for 60 seconds.
3. The controller updates the Full Open Time and Full Close Time menu items for the device the position sensor is attached to.

Enable Position Alarm

When this menu item is set to YES, the controller activates the alarm relay and displays an active alarm menu item if the expected device position (based on Open and Close times) differs three or more seconds from the position sensor's reading.

```
Enable Position Alarm? YES
```



IMPORTANT NOTE: This setting has to be set to YES in order for the auto-correct feature of the position sensor and inlet device to work. If this is set to NO, it's the same as not having the position sensor installed.

~~Whether or not the alarm is enabled, if the expected device position (based on Open and Close times) differs three or more seconds from the position sensor's reading, the position sensor reading is used the next time the device needs to move. The controller automatically corrects the time-based position.~~

Operating Modes: Curtains and Inlets

You must designate how curtains and inlets will operate. Ridge vents are natural only. There are four basic operating modes:

- **Natural -** Operates for all ventilation below the Tunnel Entry Temperature. Often referred to as power, minimum, or natural ventilation. Natural curtains and inlets are closed during tunnel mode.
- **Tunnel -** Operates only during tunnel mode. Tunnel curtains and inlets are closed during natural mode.
- **Static -** Operates automatically based on the static pressure sensor readings. Static pressure control menus are displayed only when a static pressure sensor is installed. Static-pressure-controlled devices open or close based on the Open and Close values entered in the Static Pressure Setting menu.
- **Temp -** Operates based on temperature (typically curtains) or operates proportionally (typically inlets) based on the number of fans running.

The above modes are combined for the following menu choices.

- **Static Tunnel Only** - The device only operates during tunnel mode and is controlled by static pressure.
- **Temp Natural Only** - The device only operates during natural mode. An inlet opens or closes based on the number of fan groups running (proportional control). A curtain opens or closes based on its Open Temp and Close Temp.
- **Static Natural Only** - The device only operates during natural mode and is controlled by static pressure.
- **Temp Natural/Temp Tunnel** - During natural mode, an inlet operates based on the number of fan groups running (proportional control). A curtain operates based on its Open Temp and Close Temp settings. During tunnel mode, the inlet or curtain operates based on proportional control.
- **Temp Natural/Static Tunnel** - During natural mode, an inlet operates based on the number of fan groups running (proportional control). A curtain operates based on its Open Temp and Close Temp settings. During tunnel mode, the inlet or curtain operates based on static pressure.
- **Temp Tunnel Only** - The inlet or curtain operates only during tunnel mode and its position is based on the number of fan groups running (proportional control).
- **Static Natural/Temp Tunnel** - During natural mode, the device operates based on static pressure. During tunnel mode, the device operates based on proportional control.
- **Static Natural/Static Tunnel** - The device operates based on static pressure during natural mode and tunnel mode.

See Appendix B for a summary of how inlets/curtains behave in each mode.

Curtain Settings

Refer to the Temperature Control Settings section for information about interlocking a heater or ridge vent to your curtains. Interlocking a heater prevents it from turning on when the curtain is open more than one inch. Interlocking a ridge vent allows it to open and close in sync with a curtain resulting in enhanced air quality.

Use Sensors

Input the group numbers of the air sensors you want to use for controlling the curtain. The controller uses Shared Sensor Technology to average the temperature readings of any sensors you want to use to control any device. This menu item only appears when the curtain uses a temperature-controlled mode (refer to the *Operating Modes: Curtains and Inlets* section).

```
Use Sensors: ALL              (Avg  74.7)
```

Opening and Closing Temp

Input the temperatures at which the controller should open and close the side curtain (when the curtain is in a temperature-control mode). When the temperature is at or above the Open Temp, the controller opens the curtain as many inches as you designate (see below). When the temperature is at or below the Close Temp, the controller closes the curtain as many inches as you designate (see below).

```
Open Temp:  80.0  Close Temp:  75.0
```

This menu item doesn't appear for curtains set up for tunnel or static control (refer to the *Operating Modes: Curtains and Inlets* section).

Open This Distance and Pause

Input the distance the controller should open the curtain before pausing. Then input the Pause time. After the Pause time, the controller checks the temperature and determines if it should open the curtain more, do nothing, or begin closing it.

```
Open  12"   and Pause: 0:02:00
```

This menu item doesn't appear for curtains set up for static control (refer to the *Operating Modes: Curtains and Inlets* section).



The controller has a minimum motion time of three seconds. For example, if a curtain moves 60 inches in 60 seconds, 3 inches is the smallest change in opening size that can be made. Opening sizes should be set large enough to allow a minimum of three seconds movement from one setting to the next.

Close This Distance and Pause

Input the distance the controller should close the curtain before pausing. Then input the Pause time. After the PAUSE time, the controller checks the temperature and determines if it should close the curtain more, do nothing, or begin opening it.

```
Close  12"  and Pause: 0:02:00
```

This menu item doesn't appear for curtains set up for static control (refer to the *Operating Modes: Curtains and Inlets* section).

Static Pressure Pause Timer

Input the time the curtain should pause after it moves due to a change in static pressure. The pause time prevents the curtain from responding too often to changes in static pressure. This menu item appears only when the curtain is set up to run according to static pressure. If the curtain moves too often, try increasing the time entered here.

```
Static Pressure Pause Timer:  0:15
```

Operating Mode

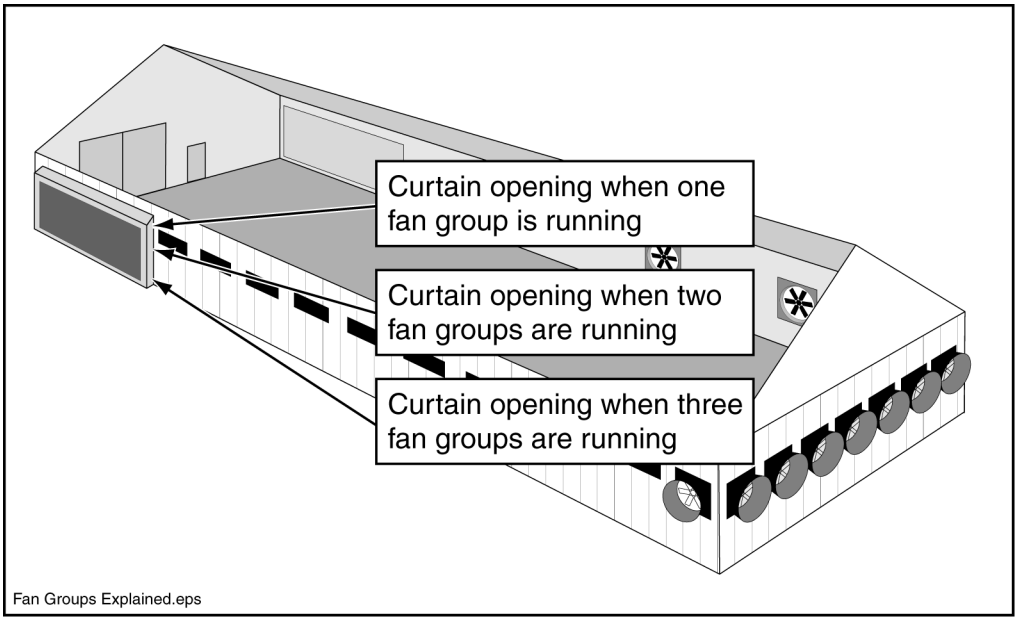
Refer to the *Operating Modes: Curtains and Inlets* section for a list of modes. This menu item appears only when a tunnel fan (allows for tunnel mode) or a static pressure sensor (allows for static pressure controlled modes) is installed. Otherwise, the controller assumes the curtain is Temp Natural Only.

```
Operate as: Temp Natural Only
```



Proportional Control (Tunnel Modes Only)

The following menu items allow the curtain to open proportionately to fans set up for proportional control. You must use a static pressure sensor (even if you don't plan on using one with the controller) to set up the curtain openings for each stage of fan ventilation. Measure the static pressure while one fan group is running and adjust the curtain opening until the static pressure is at the correct level. Record the curtain opening size. Next, measure the static pressure while two fan groups are running and adjust the curtain opening until the static pressure is at the correct level. Repeat the process until all of the fan groups are running.





Tunnel Fan Groups On \ Opening Size

Input the desired curtain opening size for each potential number of simultaneously operating tunnel fan groups. Fans are designated as tunnel in the Operating Mode menu (this includes combinations such as tunnel & cool). You can specify zero (a minimum opening size) through nine fan groups.

Variable speed tunnel fans can be entered in 0.5 increments to account for ramping operating speeds.

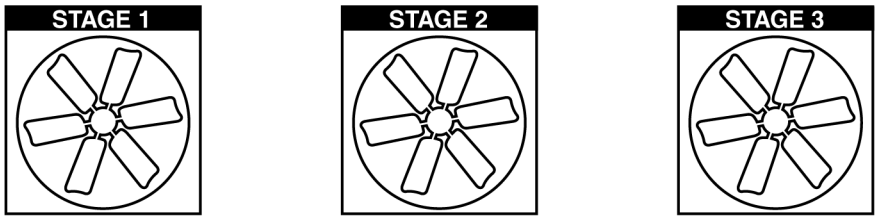
```
#01   Tunnel Fans ON: 0.0  Open:   0.0
#02   Tunnel Fans ON: 0.5  Open:  12.0
#03   Tunnel Fans ON: 1.0  Open:  24.0
```

Press the PLUS or MINUS keys when this menu item is displayed to change the setting number (one through nine).



If there is no “0 Tunnel Fans ON” position, the curtain will NOT open until the fan setting specified by the first ramp position table entry is reached. The zero position allows the controller to interpolate between zero and the next specified Fans ON position.

Variable Speed Fan Power Settings



Full Power = 30 **Full Power = 30** **Full Power = 30**

Even though the variable speed fans in this example reach full power at 30, the controller considers each fan as "0.5" since the potential full power setting is 60. Refer to the *Fan Settings* section for more information about Full Power Setting.

```
#01   Tunnel Fans ON: 0.0  Open   0.0"
#02   Tunnel Fans ON: 0.5  Open  12.0"
#03   Tunnel Fans ON: 1.0  Open  24.0"
#04   Tunnel Fans ON: 1.5  Open  36.0"
```

Tunnel VS Fan Settings.eps

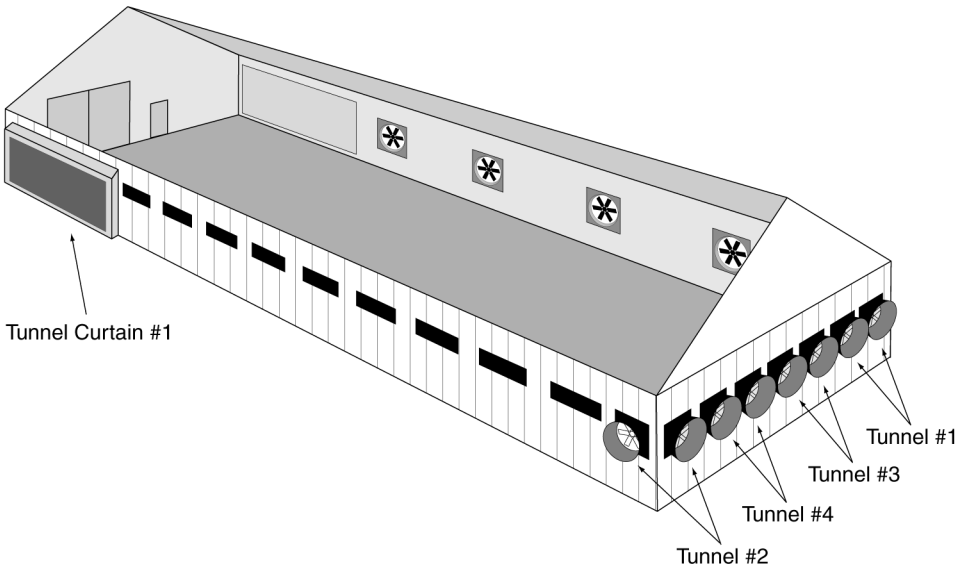


Tunnel Interlock to Fan

This is an extension of the Tunnel Fan Groups On / Opening Size menu item. Instead of opening a curtain based on the number of fans running, you can interlock **specific** tunnel fans with curtains (open the curtain based on the number of interlocked fans running).

```
Tunnel Interlock 1 to: Tunnel Fan#1
```

You can interlock up to nine specific fan groups with a curtain. Press the PLUS or MINUS key to change the Interlock number (one through nine). This menu item limits the fan groups counted when determining the appropriate position of the curtain (refer to the previous Fan Groups On / Opening Size Menu). It only allows selection of installed fans whose "Use for Proportional Control" setting is YES.



Interlock Number	Fan	Fan ON Temp	Tunnel Curtain will Open
Interlock 1	Tunnel 1	80	12"
Interlock 2	Tunnel 2	82	24"
Interlock 3	Tunnel 3	84	36"
Interlock 4	Tunnel 4	86	48"

Interlock Tunnel Curtains and Fans.eps

You can select each fan group only once for each curtain.

Response Mode

Select a response mode:

Standard – Allows the curtains to open and pause for the times you input.

Aggressive – Allows the curtains to move faster if the temperature is changing quickly. If the temperature is more than 2 degrees Fahrenheit or Celsius beyond the open or close temperature, the curtain opens or closes twice the distance you input and then pauses for only half the time. If the temperature moves further from the open or close temperature, the curtain moves further and more often.

```
Response Mode: STANDARD
```



Calibration

The curtains calibrate automatically with the control when they open or close completely. If the curtain does not close completely in cool conditions, check to make sure the manual winch has been properly adjusted.



Full Opening Size

Input the full opening size.

```
Full Opening Size (Inches):  48
```



Full Open Travel Time

Input the time it takes for the curtain to open completely. The controller uses this time to determine how open the curtain is, so enter the exact travel time.

```
Full Open Travel Time:  6:00
```



Full Close Travel Time

Input the time it takes for the curtain to close completely. The controller uses this time to determine how closed the curtain is, so enter the exact travel time.

```
Full Close Travel Time:  6:00
```

Curtain Calibration at Power Up

When the controller is powered after a reset or power outage, curtains controlled by static pressure will:

- Go into their tunnel mode setting if the temperature is above the Tunnel Entry temperature.
- Fully close if the outside temperature is 10 degrees Fahrenheit (5.5 degrees Celsius) or more below the setpoint temperature. Then the curtains open to their proper opening size.
- Fully open, if the outside temperature is not more than 10 degrees Fahrenheit (5.5 degrees Celsius) below the setpoint temperature. Then the curtains close to their proper opening size.

The controller checks the inside air sensors if no outside air sensor is installed.

Purge Opening Size

The curtain can be used as a purge opening for purge fans. This menu item appears only if you have entered purge settings in the Purge Settings menu. Input zero to disable the curtain during the purge function. The purge opening size must be large enough to allow at least three seconds of movement.

```
Purge Opening Size (Inches):   6
```



Some curtains overlap the opening edge by several inches. A few inches of travel may not be enough to produce an opening. Make sure the purge setting allows travel beyond the edge of the opening.

Pre-Open Timer

This menu item allows static-pressure-controlled or proportional-controlled curtains to open in advanced of a timed fan turning on ("timed" includes minimum ventilation cycles). Input the number of seconds, up to one minute, the curtain should start opening prior to the start of a timed fan. The pre-open time alleviates the spike in static pressure that might otherwise occur when fans turn on before curtains are adequately open.

```
Pre-Open Timer:  0:30
```

Normal static-pressure or proportional control is resumed once the timed cycle begins.

Natural Mode Operation

There are three conditions that can cause natural curtains to react differently than described above.

Stop Sooner

The curtain immediately stops opening or closing when the temperature returns to between the Open Temp and Close Temp.

Abort Pause Time

The controller aborts the open or close pause time if the opposite movement temperature is reached during the pause time. This reduces drastic temperature changes inside the building especially in winter when rapid cooling can occur.

Skip a Movement (double the pause time)

The controller skips a curtain open or close movement if the temperature appears to be moving in the right direction after the first movement is completed. The controller skips only one movement in a given open or close cycle. This reduces curtain movement.

Ridge Vent Settings

Ridge vents operate in natural mode only so there is no operating mode selection as in other types of inlets.



If you have interlocked ridge vents to curtains (see the *Temperature Control Settings* section) then only the Calibration, Purge and Interlock menu items appear.

Use Sensors

Input the group numbers of the air sensors you want to use for controlling the ridge vent. The controller uses Shared Sensor Technology to average the temperature readings of any sensors you want to use to control any device.

```
Use Sensors: ALL              (Avg  74.7)
```

Opening and Closing Temp

Input the temperatures at which the controller should open and close the ridge vent. When the temperature is at or above the Open Temp, the controller opens the ridge vent as many inches as you designate (see below). When the temperature is at or below the Close Temp, the controller closes the ridge vent as many inches as you designate (see below).

```
Open Temp:  80.0  Close Temp:  75.0
```

Open This Distance and Pause

Input the distance the controller should open the ridge vent before pausing. Then input the Pause time. After the Pause time, the controller checks the temperature and determines if it should open the ridge vent more, do nothing, or begin closing it.

```
Open  12"   and Pause: 00:02:00
```



The controller has a minimum motion time of three seconds. Opening sizes should be set large enough to allow a minimum of three seconds movement from one setting to the next.

Close This Distance and Pause

Input the distance the controller should close the ridge vent before pausing. Then input the Pause time. After the PAUSE time, the controller checks the temperature and determines if it should close the ridge vent more, do nothing, or begin opening it.

```
Close  12"  and Pause: 00:02:00
```

Response Mode

Select a response mode:

Standard – Allows the ridge vent to open and pause for the times you input.

Aggressive – Allows the ridge vent to move faster if the temperature is changing quickly. If the temperature is more than 2 degrees Fahrenheit or Celsius beyond the setpoint, the ridge vent opens or closes twice the distance you input and then pauses for only half the time. If the temperature moves further from the setpoint, the ridge vent moves further and more often.

```
Response Mode: STANDARD
```



Calibration

The ridge vents calibrate automatically with the control when they open or close completely. If the ridge vent does not close completely in cool conditions, check to make sure the vent has been properly adjusted. After an electrical failure, the controller restarts and assumes ridge vents are half open. Ridge vents recalibrate when the controller completely opens or closes them again.



Full Opening Size

Input the full opening size.

```
Full Opening Size (Inches):  14”
```



Full Open Travel Time

Input the time it takes for the ridge vent to open completely. The controller uses this time to determine how open the ridge vent is, so enter the exact travel time.

```
Full Open Travel Time:  0:45
```



Full Close Travel Time

Input the time it takes for the ridge vent to close completely. The controller uses this time to determine how closed the ridge vent is, so enter the exact travel time.

```
Full Close Travel Time:  0:45
```

Purge Opening Size

The ridge vent can be used as a purge opening for purge fans. This menu item appears only if you have entered purge settings in the Purge Settings menu. Input zero to disable the ridge vent during the purge function. The purge opening size must be large enough to allow at least three seconds of movement.

```
Purge Opening Size (Inches):   4”
```

Interlock Curtain Groups

If you have set the Ridge to Curtains Interlock (refer to the *Temperature Control Settings* section) you can specify the curtain groups here. Interlocking ridge vents to curtains enhances air quality in a building while maintaining good temperature control. When ridge vents are interlocked, their open and close settings are ignored. The interlocked ridge vent attempts to open the same number of inches as the curtain with the largest opening size. For example, a curtain has a maximum opening size of 48 inches, and the ridge vent's maximum opening size is 10 inches. As the curtain opens, the ridge vent will also open the same amount as the curtain. When the curtain is open 10 inches, the ridge vent will be fully open at 10 inches.

```
Interlock Curtain Grps: 1, 2, 3, 0, 0, 0
```

Input up to six curtain groups.

Chimney Damper

The chimney damper is a unique device because it contains a fan and an inlet. If you use this type of device, install the fan portion as a ridge fan and the damper portion as a chimney damper.



Proportional Control

The following menu items allow the chimney damper to open or close based on the number of ridge fan groups running. When interlocked fans are disabled due to open curtains (or no ridge fans are installed), the chimney damper opens or closes based on curtain opening size. The chimney damper attempts to open the same number of inches as the curtain with the largest opening size. For example, a curtain has a maximum opening size of 48 inches, and the chimney damper's maximum opening size is 10 inches. When the curtain is open 10 inches, the chimney damper is fully open at 10 inches.



Cool Fan Groups On \ Opening Size

Input the desired chimney damper opening size for each potential number of simultaneously operating ridge fan groups. The fans must be designated as cool in the Operating Mode menu (this includes combinations such as tunnel & cool). You can specify one through nine fan groups.

```
#01     Cool Fans ON: 0    Open:   0
#02     Cool Fans ON: 1    Open:   3
```

When variable speed ridge fans are installed, they can be entered in 0.5 increments to account for ramping operating speeds.

Press the PLUS or MINUS keys when this menu item is displayed to change the setting number (one through nine).



Interlock to Fan

This is an extension of the Cool Fan Groups On / Opening Size menu item. Instead of opening a chimney damper based on the number of fans running, you can interlock **specific** ridge fans with a chimney damper. That way, the chimney damper opens based on **interlocked** ridge fans.

```
Natural Interlock 1 to: Ridge Fan#1
```

Interlock up to nine specific ridge fan groups with a chimney damper. Press the PLUS or MINUS key to change the Interlock number (one through nine). This menu item only allows selection of ridge fans whose "Use for Proportional Control" setting is YES. You can select each fan group only once for each chimney damper.



Calibration

The chimney dampers calibrate automatically with the controller when they open or close completely.



Full Opening Size

Input the full opening size.

```
Full Opening Size (Inches):  14"
```



Full Open Travel Time

Input the time it takes for the chimney damper to open completely. The controller uses this time to determine how open the damper is, so enter the exact travel time.

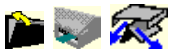
```
Full Open Travel Time:  0:45
```



Full Close Travel Time

Input the time it takes for the chimney damper to close completely. The controller uses this time to determine how closed the damper is, so enter the exact travel time.

```
Full Close Travel Time:  0:45
```



Inlet Settings

Inlets are typically a proportionally controlled device so the menu items Open this distance and Close this distance are not used. Instead, when an inlet needs to open or close more, the proportional control or static pressure control settings are used.



The controller has a minimum motion time of three seconds. Opening sizes should be set large enough to allow a minimum of three seconds movement from one setting to the next.

Static Pressure Pause Timer

Input the time the inlet should pause after it moves due to a change in static pressure. The pause time prevents the inlet from responding too often to changes in static pressure. This menu item appears only when the inlet is set up to run according to static pressure. If the inlet moves too often, try increasing the time entered here.

```
Static Pressure Pause Timer:  0:15
```

Operating Mode

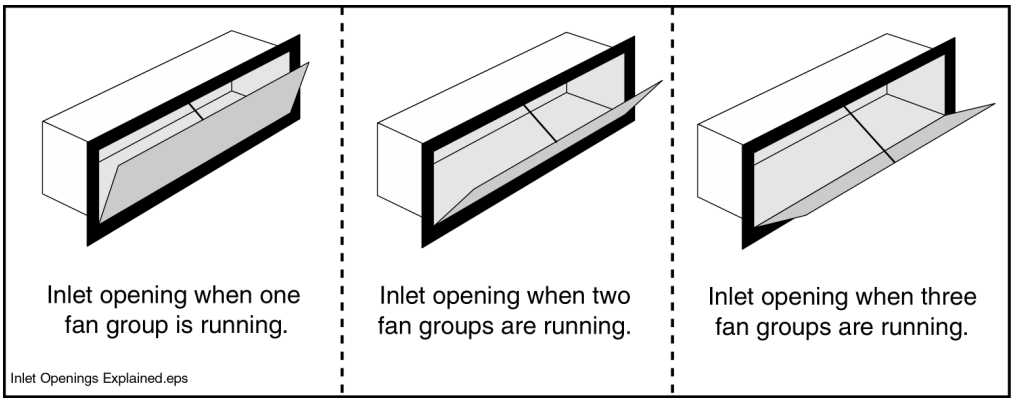
Refer to the *Operating Modes* section for a list of operating modes.

```
Operate as: Temp Natural Only
```



Proportional Control

The following menu items allow the inlet to open proportionately to fans set up for proportional control. Natural inlets typically open proportionately to the fans. You must use a static pressure sensor (even if you don't plan on using one with the controller) to set up the inlet openings for each stage of fan ventilation. Measure the static pressure while one fan group is running and adjust the inlet opening until the static pressure is at the correct level. Record the inlet opening size. Next, measure the static pressure while two fan groups are running and adjust the inlet opening until the static pressure is at the correct level. Repeat the process until all of the fan groups are running.





Cool Fan Groups On \ Opening Size

Input the desired inlet opening size for each potential number of simultaneously operating cool fan groups. Fans are designated as cool in the Operating Mode menu (this includes combinations such as tunnel & cool). You can specify zero (a minimum opening size) through nine fan groups.

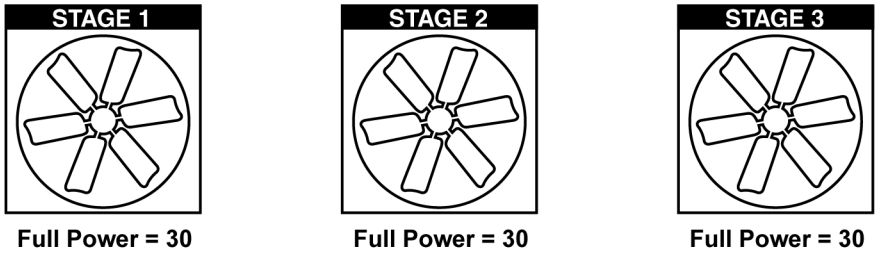
When variable speed fans are installed, they can be entered in 0.5 increments to account for ramping operating speeds.

```
#01     Cool Fans ON: 0.0  Open:   0.0
#02     Cool Fans ON: 0.5  Open:  12.0
#03     Cool Fans ON: 1.0  Open:  24.0
```

Press the PLUS or MINUS keys when this menu item is displayed to change the setting number (one through nine).

If there is no "0 Cool Fans ON" position, the inlet will NOT open until the fan setting specified by the first ramp position table entry is reached. The zero position allows the controller to interpolate between zero and the next specified Fans ON position.

Variable Speed Fan Power Settings



Full Power = 30 **Full Power = 30** **Full Power = 30**

Even though the variable speed fans in this example reach full power at 30, the controller considers each fan as "0.5" since the potential full power setting is 60. Refer to the *Fan Settings* section for more information about Full Power Setting.

```
#01     Cool Fans ON: 0.0  Open   0.0"
#02     Cool Fans ON: 0.5  Open  12.0"
#03     Cool Fans ON: 1.0  Open  24.0"
#04     Cool Fans ON: 1.5  Open  36.0"
```

VS Fan Settings.eps

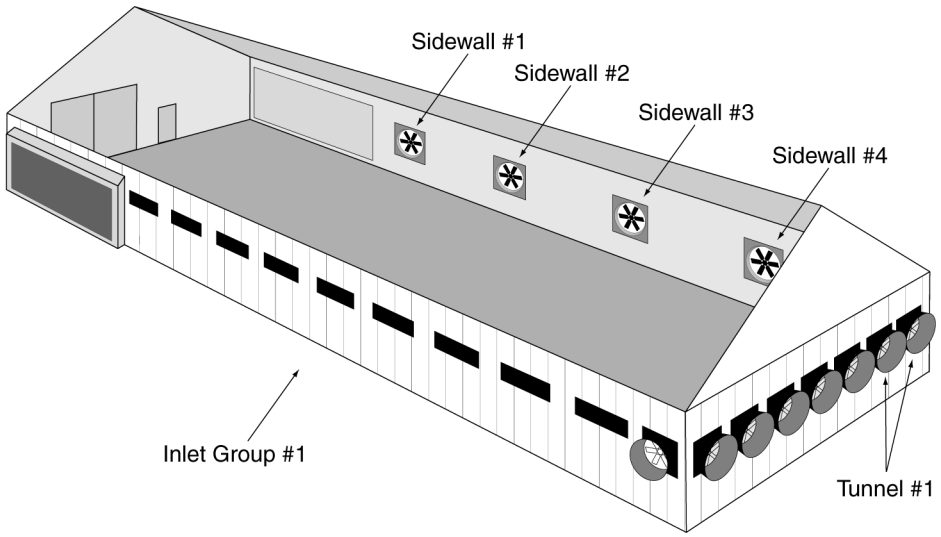


Natural Interlock to Fan

This is an extension of the Cool Fan Groups On / Opening Size menu item. Instead of opening an inlet based on the number of fans running, you can interlock **specific** fans with inlets (open the inlet based on the number of interlocked fans running).

```
Natural Interlock 1 to: Sidewall Fan#1
```

You can interlock up to nine fan groups with an inlet. Press the PLUS or MINUS key to change the Interlock number (one through nine). This menu item limits the fan groups counted when determining the appropriate position of the inlet (refer to the previous Fan Groups On / Opening Size Menu). This menu item only allows selection of installed fans whose “Use for Proportional Control” setting is YES.



Interlock Number	Fan	Fan ON Temp	Inlets will Open
Interlock 1	Sidewall 1	80	1"
Interlock 2	Sidewall 2	82	3"
Interlock 3	Sidewall 3	84	5"
Interlock 4	Sidewall 4	86	8"
Interlock 5	Tunnel 1 *	90	11"

* Needs to be *Tunnel & Cool* operating mode

Interlock Natural Inlets and Fans.eps

You can select each fan group only once for each inlet.



Tunnel Fans Groups On \ Opening Size

Input the desired inlet opening size for each potential number of simultaneously operating tunnel fan groups. Fans are designated as tunnel in the Operating Mode menu (this includes combinations such as tunnel & cool). You can specify zero (a minimum opening size) through nine fan groups.

Variable speed tunnel fans can be entered in 0.5 increments to account for ramping operating speeds.

```
#01   Tunnel Fans ON: 0.0  Open:   0.0
#02   Tunnel Fans ON: 0.5  Open:  12.0
#03   Tunnel Fans ON: 1.0  Open:  24.0
```

Press the PLUS or MINUS keys when this menu item is displayed to change the setting number (one through nine).



If there is no “0 Tunnel Fans ON” position, the inlet will NOT open until the fan setting specified by the first ramp position table entry is reached. The zero position allows the controller to interpolate between zero and the next specified Fans ON position.

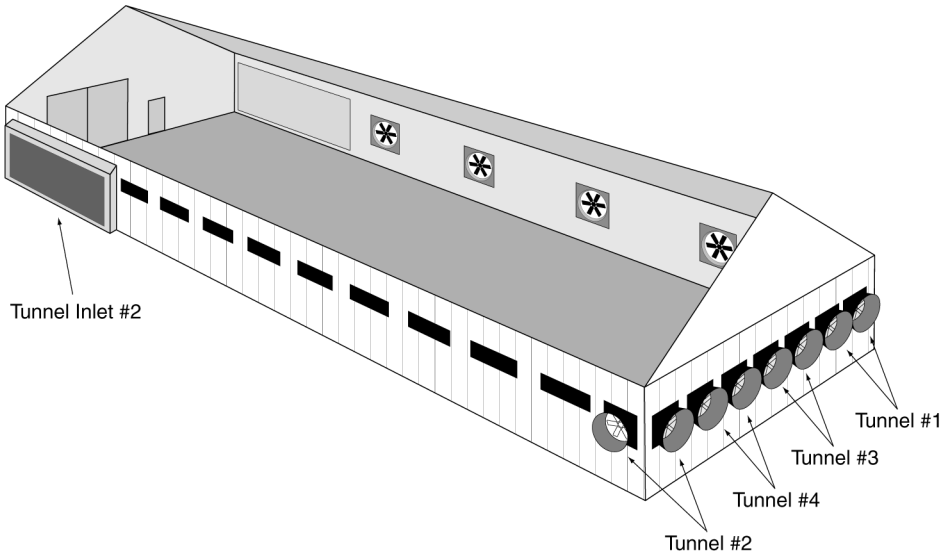


Tunnel Interlock to Fan

This is an extension of the Tunnel Fan Groups On / Opening Size menu item. Instead of opening an inlet based on the number of fans running, you can interlock **specific** tunnel fans with inlets (open the inlet based on the number of interlocked fans running).

```
Tunnel Interlock 1 to: Tunnel Fan#1
```

You can interlock up to nine fan groups with an inlet. Press the PLUS or MINUS key to change the Interlock number (one through nine). This menu item limits the fan groups counted when determining the appropriate position of the inlet (refer to the previous Fan Groups On / Opening Size Menu). This menu item only allows selection of installed fans whose "Use for Proportional Control" setting is YES.



Interlock Number	Fan	Fan ON Temp	Tunnel Inlet will Open
Interlock 1	Tunnel 1	80	12"
Interlock 2	Tunnel 2	82	24"
Interlock 3	Tunnel 3	84	36"
Interlock 4	Tunnel 4	86	48"

Interlock Tunnel Inlets and Fans.eps

You can select each fan group only once for each inlet.



Calibration

The inlets calibrate automatically with the control when they open or close completely. If the inlet does not close completely in cool conditions, check to make sure the manual winch has been properly adjusted.



Full Opening Size

Input the full opening size.

```
Full Opening Size (Inches):  12
```



Full Open Travel Time

Input the time it takes for the inlet to open completely. The controller uses this time to determine how open the inlet is, so enter the exact travel time.

```
Full Open Travel Time:  1:00
```



Full Close Travel Time

Input the time it takes for the inlet to close completely. The controller uses this time to determine how closed the inlet is, so enter the exact travel time.

```
Full Close Travel Time:  1:00
```

Inlet Calibration at Power Up

When the controller is powered after a reset or power outage, inlets controlled by static pressure will:

- Go into their tunnel mode setting if the temperature is above the Tunnel Entry temperature.
- Fully close if the outside temperature is 10 degrees Fahrenheit (5.5 degrees Celsius) or more below the setpoint temperature. Then the inlets will open to their proper opening size.
- Fully open, if the outside temperature is not more than 10 degrees Fahrenheit (5.5 degrees Celsius) below the setpoint temperature. Then the inlets will close to their proper opening size.

The controller checks the inside air sensors if no outside air sensor is installed.

Purge Opening Size

The inlet can be used as a purge opening for purge fans. This menu item appears only if you have entered purge settings in the Purge Settings menu. Input zero to disable the inlet during the purge function. The purge opening size must be large enough to allow at least three seconds of movement.

```
Purge Opening Size (Inches):   6
```

Pre-Open Timer

This menu item allows static-pressure-controlled or proportional-controlled inlets to open in advanced of a timed fan turning on ("timed" includes minimum ventilation cycles). Input the number of seconds, up to one minute, the inlet should start opening prior to the start of a timed fan. The pre-open time alleviates the spike in static pressure that might otherwise occur when fans turn on before inlets are adequately open.

```
Pre-Open Timer:  0:30
```

Normal static-pressure or proportional control resumes once the timed cycle begins.

Furnace, Heater and Brooder Settings

Use Sensors

Input the group numbers of the air sensors you want to use for controlling the furnace, heater or brooder. The controller uses Shared Sensor Technology to average the temperature readings of any sensors you want to use to control any device.

```
Use Sensors: ALL              (Avg  74.7)
```

On and Off Temps

Press ENTER to input the temperature at which the controller should turn on the furnace, heater or brooder. Press ENTER again to input the temperature at which the controller should turn the device off.

```
ON Temp:  71.0     OFF Temp:  75
```

Interlock Curtain Groups

If you have set the Heater to Curtains Interlock (refer to the *Temperature Control Settings* section) specify the curtain (and ridge vent) groups here. When interlocking is enabled for heaters (and brooders and furnaces), and the controller detects that the heater's ON Temp has been reached, the heater will not turn on if the interlocked curtains are open more than about one inch.

```
Interlock Curtain Grps: 1, 2, 3, 0, 0, 0
```

Input up to six curtain groups. Enter all zeros to interlock the heater with all groups.

Cool Pad, Mister and Fogger Settings

Use Sensors

Input the group numbers of the air sensors you want to use for controlling the cool pad, mister or fogger (mister or fogger is not available as a menu item on some controllers). The controller uses Shared Sensor Technology to average the temperature readings of any sensors you want to use to control any device.

```
Use Sensors: ALL              (Avg  74.7)
```

Time of Day to Enable / Disable

The cool pad, mister or fogger (evaporative cooling devices) can be enabled for a certain period of day to prevent having the device turned on at an undesirable time. The device only operates between the enable and disable times. The times input here must be in a 24 hour clock format.

```
Time of Day Enable: 11:40 Disable: 19:00
```

Humidity Disable / ReEnable

Evaporative cooling looses its effectiveness as humidity inside the building increases. Input a relative humidity level at which evaporative cooling should be disabled. Then, input the level at which evaporative cooling will be re-enabled.

```
HUMIDITY Disable:  85% ReEnable:  75%
```

When the humidity reaches the Disable value, the evaporative cooling device remains disabled until the humidity drops to the ReEnable value. Set the Disable or ReEnable value to 100 percent to have the controller ignore the disable/re-enable feature entirely.

To use this feature, the controller must have a humidity sensor attached.

Stress Index Disable

Either high temperature or high humidity can stress animals, but a combination of high temperature *and* high humidity is very stressful and it can be deadly. The combination of humidity plus temperature is called the stress index.

Input a stress index level at which evaporative cooling should be disabled. Then, input a stress index level at which evaporative cooling will be re-enabled.

```
TEMP+HUMIDITY Disable: 160 ReEnable 140
```

The following chart illustrates how different combinations of temperature and humidity produce a Stress Index of 175.

Degrees Fahrenheit	+ Relative Humidity	= Stress Index
75	100	175
80	95	175
85	90	175
90	85	175
95	80	175
100	75	175
105	70	175
110	65	175

Set the Disable or ReEnable value to 220 to have the controller ignore the disable/enable feature entirely.

To enable this feature, an air sensor and humidity sensor must be installed.

Full On and Off Temp

The FULL ON Temp is the temperature at which the controller should turn on evaporative cooling continuously. When the temperature is between the OFF Temp and the FULL ON Temp, the cycle table is used (see below).

```
FULL ON Temp:  88.0   OFF Temp:  75.0
```

Cycle On Temp and On/Off Timers

When the temperature is between the OFF Temp and the FULL ON Temp, the controller scans the on temperature values input here. It locates the current temperature and uses the ON and OFF timers specified for that temperature. If Cycle Timers are not set up, the controller simply uses the FULL ON Temp and the OFF Temp.

Cycle one should be the lowest temperature and cycle four should be the highest. The cycle one temperature is usually slightly higher than the OFF Temp.

Setting the ON and OFF timers to any non-zero value enables their operation. When the ON timer is complete, the OFF timer starts running. When it is complete, the ON timer starts again. This cycle repeats for as long as the cycle timer is on.

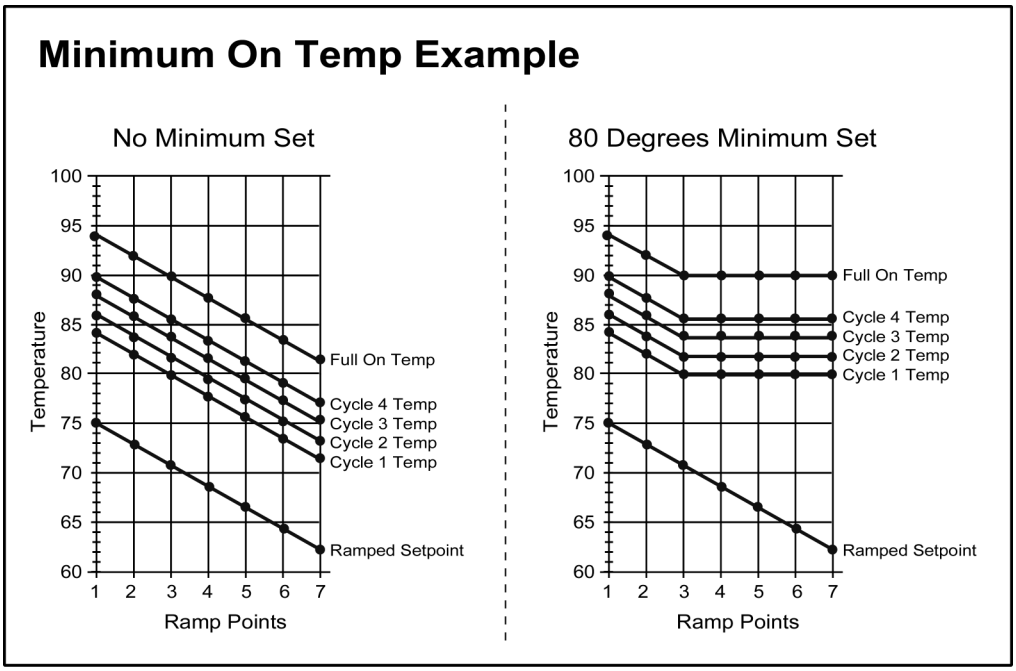
```
Cycle #1 ON Temp:  76.5
Cycle #1 Timer ON: 0:01:00  OFF: 0:00:30
```

Press the PLUS and MINUS keys to navigate through cycles 1 through 4. Input an ON TEMP as well as the ON and OFF times for each cycle you want to use.

Minimum On Temp

As the temperature ramps down over the growing period (assuming you use the temperature ramping feature), you may reach a temperature at which evaporative cooling should not be used. Specify a Minimum On Temp for the evaporative cooling devices. If you have set up staged cycles for a device, the minimum is applied to Cycle 1. The temperature differences for the other cycles are maintained (cycle one should be set up as the lowest temperature when you use cycles).

The following charts illustrate the effect of using a Minimum On Temp for an evaporative cooling device.



The device will not turn on unless the temperature is at or above the temperature you input here.

```
Minimum On Temp:  80.0
```

The next menu item is the current On Temps for each evaporative cooling cycle. The last temperature displayed is the current Full On Temp. The Full On Temp is also influenced by the Minimum On Temp.

```
Min Temps: 84.0, 86.0, 88.0, 90.0, 94.0
```

Fan Settings

Introduction



This section provides information for fixed-speed fans and variable-speed fans. Menu items specific to variable speed fans have the variable-speed fan symbol next to them.

Use Sensors

Input the group numbers of the air sensors you want to use for controlling the fan group. The controller uses Shared Sensor Technology to average the temperature readings of any sensors you want to use to control any device.

```
Use Sensors: ALL              (Avg  74.7)
```

Operating Mode

Each fan can operate in one of nine different operating modes:

Cool – The fan exhausts hot air from the building. The fan turns on when the temperature rises to the ON temperature and turns off when the building cools to the OFF temperature (if set up to run on temperature).

Heat – The fan blows hot air into the building from a warmer area. The fan turns on at a low temperature set as the ON temperature and turns off at a higher temperature set as the OFF temperature.

Purge – The fan runs during a purge cycle to clear humidity, ammonia, and bad air from the building. The fan runs based on the purge settings you entered in the Purge Settings menu.

Cool & Purge – The fan runs in cool mode when the temperature is at or above the fan's ON temperature and during purge cycles when the temperature is below the ON temperature.

Heat & Purge – The fan runs in heat mode when the temperature is below the fan's ON temperature and during purge cycles when the temperature is above the ON temperature.

Tunnel – The fan runs during tunnel mode. Tunnel mode moves air from the tunnel inlets, through the building, and out through the tunnel fans. It closes all natural sidewall inlets and curtains. Typically, more groups of tunnel fans turn on as the temperature rises.

Tunnel & Cool – The fan runs in cool mode when the temperature is below the Tunnel Entry temperature (refer to the *Temperature Control Setting* section) and in tunnel mode when the temperature is at or above fan's ON temperature.

Tunnel & Purge – The fan runs during purge cycles when the temperature is below the Tunnel Entry temperature and in tunnel mode when the temperature is at or above the fan's ON temperature.

Tunnel, Cool, Purge – The fan runs during purge cycles when the temperature is below the ON temperature, in cool mode when the ON temperature is reached, and in tunnel mode when the temperature is at or above the fan's ON temperature.

```
Operating Mode: Cool & Purge
```

Fan On and Off Temps

Input the temperatures at which the fan group should turn on and turn off.

```
ON Temp:  71.0     OFF Temp:  70.0
```



Fan On Power Setting

Input a value from 0 (off) to 60 (full power) for the power level the fan should operate at when the temperature is at or above the ON Temp.

```
Fan ON Power Setting: 25
```

Test the power setting as you adjust it by selecting YES when prompted. Press the PLUS or MINUS keys to switch between YES and NO.

```
Test New Power Setting: YES
```



The RPM of most PSC type fan motors is controlled by varying the amount of power (voltage) applied. The way a PSC motor responds to a given power setting varies considerably between fan motor manufacturers. One motor may require a setting of 50 to run at full speed while another just 35.

Fans always get a five second full power burst (see the Full Power Setting menu item) at start up before adjusting to the specified power setting.



Power Ramp Starting Temp

Input the temperature at which power ramping should start. Power ramps from the fan ON Temp (see above) to the FULL Power Temp (see below) as the temperature rises.

```
Power Ramping Start Temp:  73.0
```



Full Power Temp

Input the temperature at which the fan group should be operating at the FULL Power Setting (see below).

```
FULL Power Temp:  80.0
```



Full Power Setting

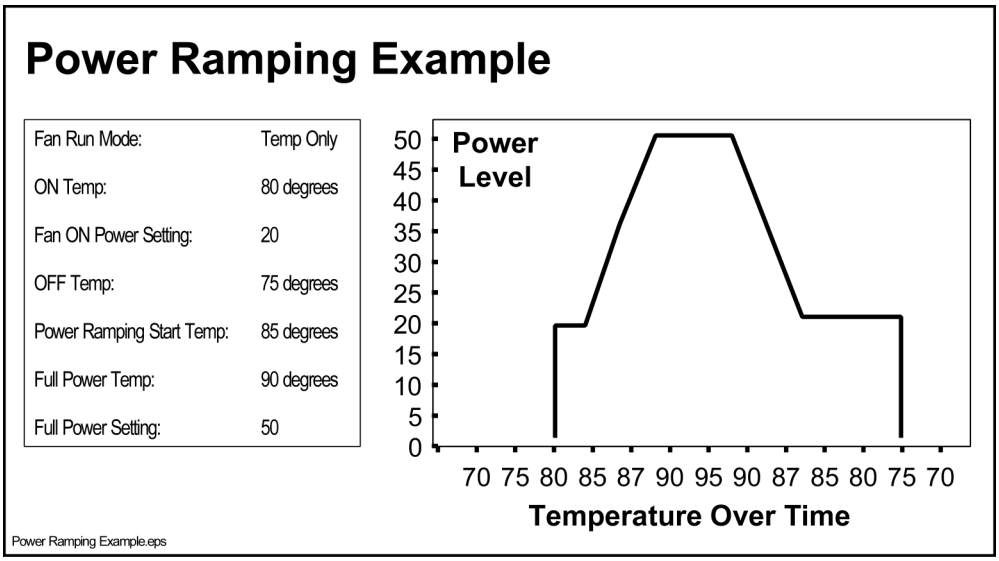
Input the power setting value the fan group should operate at when the FULL Power Temp is reached (see above).

```
Full Power Setting: 50
```

Test the power setting as you adjust it by selecting YES when prompted. Press the PLUS or MINUS keys to switch between YES and NO.

```
Test New Power Setting: YES
```

The graph below shows how the fan power automatically adjusts as the building temperature rises from 70 degrees to 95 degrees and falls back to 70 degrees again.



Observe that fan power stays at zero until the ON Temp is reached. As temperature falls the power stays at the Fan ON Power setting until the OFF Temp is reached.

Fan Run Mode

Each fan can operate in one of five different run modes. The ON/OFF temperature descriptions below assume "cool" fans. Reverse the description for "heat" fans.

Temp Only – The fan runs when the temperature is at or above the ON temperature. The fan turns off when the temperature is at or below the OFF temperature.

Timed Only – The fan cycles on and off continuously based on the ON and OFF times you input.

Temp or Timed – The fan runs according to temperature control when the temperature is at or above the ON setting. The fan runs according to timed setting when the temperature drops back to or below the OFF setting.

Temp and Timed – The fan runs according to the timed settings when the temperature is at or above the ON setting. When the temperature drops back to or below the OFF setting, the fan does not operate.

Temp or Minimum Ventilation – The fan runs according to temperature control when the temperature is at or above the ON setting. The fan runs according to the minimum ventilation times (entered in the Minimum Ventilation and Purge Settings menu) when the temperature drops back to or below the OFF setting. This mode does not appear when only stir fans are being used.

```
Run Mode: Temp And Timed
```

Fan On and Off Timers

This item is for timed fans. Input the number of hours, minutes and seconds (up to nine hours) you want the fan group to run when in a timed mode. Then, input the number of hours, minutes and seconds (up to nine hours) you want the fan group to remain off after the ON Timer is complete.

```
ON Timer:  0:10:00  OFF Timer:  0:10:00
```



Timed Power Setting

This item is for timed fans. Input the power setting that should be used when the fan is operated on time.

```
Timed Power Setting: 40
```

Test the power setting as you adjust it by selecting YES when prompted. Press the PLUS or MINUS keys to switch between YES and NO.

```
Test New Power Setting: YES
```



Purge Mode Power Setting

Input the power setting that should be used for this fan when the building is in purge mode.

```
Purge Mode Power Setting: 50
```

Test the power setting as you adjust it by selecting YES when prompted. Press the PLUS or MINUS keys to switch between YES and NO.

```
Test New Power Setting: YES
```

Run While ENTRY/EXIT of Tunnel Mode

Select this feature when you want the fan group to run while the building transitions into or out of tunnel mode. Typically, several fans are allowed to run during the transition to continue effective ventilation. Too many fans can create excessive suction and cause inlets to stick shut.

```
Run While ENTRY/EXIT of Tunnel Mode?:YES
```



Use for Proportional Control

Select this feature when you want the fan group to be used in proportional control. When a fan group is included in proportional control, it is counted in determining the total number of fan groups running. The total number of running fan groups determines the positioning of inlets and curtains. Refer to the *Curtain Settings* and *Inlet Settings* sections for more information about proportional control.

```
Use for Proportional Control?: YES
```



Stir fans cannot be used for proportional control since they are not designed to produce negative static pressure in a building.

Curtain Open Size Inhibits Fans

In buildings where curtains and fans are used, it may be desirable to inhibit a fan group when any curtain is open enough to provide natural ventilation. This is especially useful in applications where ridge fans are used. This menu item only appears when a position sensor is installed on at least one curtain and there are no active out-of-position alarms. Input an opening size at which the fan group should be disabled.

```
Fans OFF at Curtain Opening of:  24"
```

Override Fans Off

This menu item is an extension of the Fans Off menu item described above. When the temperature reaches the value you input here, the fan group resumes operation according to its time and temperature settings. The temperature input here changes daily if a temperature ramp table is set up.

```
Fan OVERRIDE Curtain Open Temp:  95.0
```

Lights Settings

On Time and Off Time

Set up to nine timers to turn on and turn off light groups. Input the on and off times for each timer using a 24-hour clock format. To set a light group for continuous on, set the ON time for timer one to 00:00 and the OFF time to 24:00. Press the UP and DOWN arrow keys to change the Setting number.

```
Setting #1 ON at 11:00, OFF at 16:00
```

Feeder Settings

On Time and Off Time

Set up to nine timers to turn on and turn off feeder groups. Input the on and off times for each timer using a 24-hour clock format. To set a feeder group for continuous on, set the ON time for timer one to 00:00 and the OFF time to 24:00. Press the UP and DOWN arrow keys to change the Setting number.

```
Setting #1 ON at 11:00, OFF at 12:00
```



Test Control Center Hardware

This menu allows you to test the input and output channels of the controller. After selecting the Test Control Center Hardware menu, press the DOWN arrow key to enter the test menu.

```
TEST CONTROL CENTER HARDWARE
Press MENU DOWN to enter test menu!!!
```

Continue to press the DOWN arrow key to scroll through the tests (described below). Press ENTER to initiate a test. Any changes you make during this test are terminated after 60 seconds.

Test Alarm Relay

This menu item tests the integrity of the controller's alarm relay, and any attached visual or audible warning devices

```
Alarm relay is OFF - Press +/- to CHANGE
```

To energize the alarm relay, press the PLUS key. Any installed warning devices should activate.

```
Alarm relay is ON  - Press +/- to CHANGE
```

To turn off the alarm relay, press the MINUS key.

Press CANCEL to return to the test menu.

Test Outputs

This menu item tests the controller's output relays.

You must have a device installed on a relay before that relay can be tested.

Select which station/module (if applicable) and output channel (called relay on some controllers) to test by scrolling through the station and channel numbers with the PLUS and MINUS keys. After you've selected an output channel by pressing ENTER, the display changes to show you what device is currently installed on that relay.

```
TEST OUTPUT of SIDE CURTAIN #01
OUTPUT is OFF - Press +/- to CHANGE
```

Turn the output channel on or off by using the PLUS and MINUS keys. If you are testing an interlocked channel, the controller turns off the sister channel if necessary prior to beginning the test.

Test Inputs

This menu item displays the sensor input as interpreted by the controller.

You must have a device installed on an input before that input can be tested.

This is designed for use by technicians when troubleshooting controller components or sensors. Select which input channel to test by scrolling through the input numbers with the PLUS and MINUS keys. After you've selected an input by pressing ENTER, the display shows the value of the input signal as reported by the analog to digital converter. The value will be a five digit number such as 34056. The controller takes another reading each time you press ENTER.

```
TEST INPUT of AIR SENSOR #01
Input reading      34285 - ENTER to READ
```

Test Output Status (12-channel controllers only)

This menu item displays which channels the controller assumes are on. You can even flip the ON/OFF/AUTO toggle switches to verify the controller recognizes their position. **This test is available for 12-channel controllers only.**

```
OUTPUTS are ON for STA 01   -Press ENTER
1   3   5
```

Test Digital Input

This test displays the digital inputs that are currently open for the selected station. Press the PLUS or MINUS keys to select a station number.

```
TEST DIGITAL INPUT for STA 1
```

Press ENTER to display the digital inputs that are currently open.

```
INPUTS are OPEN for STA 01  -Press ENTER

21 22 23 24
```

Alarm History

Alarm history displays conditions or events that may cause an active alarm condition. The Error Detail is a long-term record of any type of system, device or building abnormality that provides important information to help evaluate system problems.

Alarm History

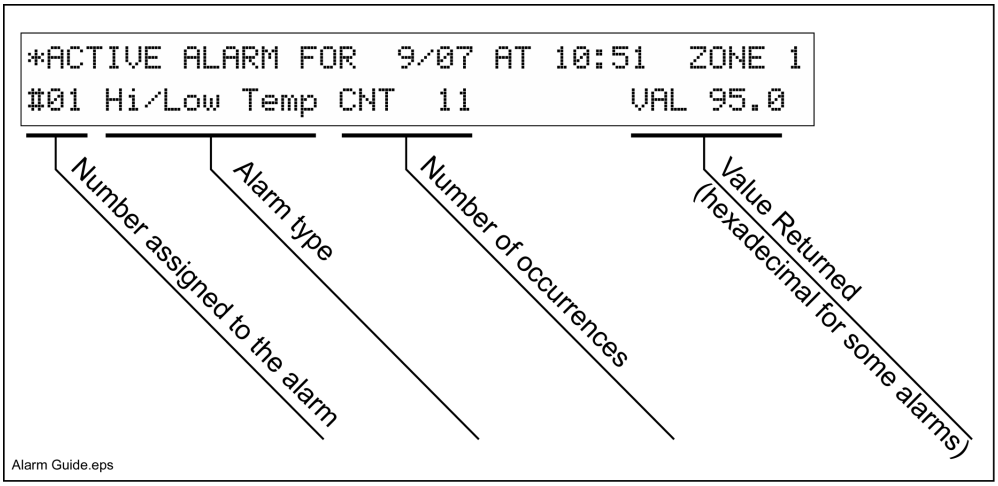


If the controller keeps displaying the Alarm History menu but does not display an active alarm, you must use the PLUS or MINUS keys to scroll through the history and locate the active alarm.

The alarm history stores up to 20 of the most recent alarms. An alarm record is created each time a new type of alarm condition is detected. Most alarm conditions require multiple occurrences to activate the alarm relay. All alarm records that are currently active or were previously active will always be displayed. If no key has been pressed for one minute, the display will show the most recent alarm. Pressing ENTER while viewing an active alarm clears the alarm condition and changes the display from active alarm to alarm history. Some alarms are automatically cleared when the alarm condition is no longer detected.

```
ALARM HISTORY FOR 12/20 AT 11:23
#01 Air  #3 STA#01 CH#14 CNT 38 VALFFFB
```

Press the PLUS and MINUS keys to move through the history of alarms.



"Zone 0" alarms occur when an alarm relates to all zones (if applicable). For example, a possible hardware problem would generate a Zone 0 alarm.

Possible Alarm Conditions

The following alarms may be displayed. They are not listed in any particular order. The alarms will be displayed in the order that they first occur.

#01 Hi/Low Temp CNT 200 VAL 101.9 Temperature exceeded alarm limits.
#01 Air #01 STA#01 CH#02 CNT251 VALFFFE Invalid temperature reading from air sensor.
#01 24-Hour Water Used - CNT 2 The total gallons used in the past 24 hours dropped more than the alarm percent drop setting.
#01 ADC5Volt STA#01 ADC:32789 CNT 104 Malfunction in the power supply or analog circuit on the station.
#01 ADC9Volt STA#02 ADC:65531 CNT 20 Malfunction in the power supply or analog circuit on the station.
#01 ADC0Volt STA#03 ADC:32802 CNT 3 Malfunction in the power supply or analog circuit on the station. Possible faulty ground going to the controller or station.
#01 Erase Error: Sctr:04 CNT 1 Error erasing parameters, history, or errors in the system FLASH memory.
#01 Write Error: Sctr:05 Add:1034 CNT 1 Error writing parameters, history, or errors to the system FLASH memory.
#01 Voltage Low CNT 12 A low power condition was detected when updating FLASH memory. The 12 VDC supplied by the control power supply is low. Check input voltage for correct value.
#01 Temp Chg STA01/05 78.1 30.9 CNT 1 An air sensor reading has changed more than 15 degrees Fahrenheit (or about 8.5 degrees Celsius) from the last reading. The new reading is marked with an "*" (to the left of the affected temp reading) in current conditions, and is ignored until it reads within 15 degrees of the previous temperature reading.
#01 Water #2 GPH Exceeds Limit CNT 105 The water flow exceeded the set limit.

#01 Feeder #01 ON Time Exceeded The feeder run time has exceeded the set limit. This alarm may also show "OFF Time Exceeded" or "Overload Detected" or "No-Load Detected."
#01 W.Dog CNT 1 The program watch dog timer caused the system to reset.
#01 Comm 13 STA#10 CH#11 CNT145 There is an error communicating with portions of the control or other stations (expansion, modem or serial interface).
#01 Low Stat Press CNT 140 VAL 0.250 Static pressure has fallen below the limits you entered. This alarm may also show "High Stat Press" or "Lo Cyc Stat Press" or "Fan Lo Stat Press."
#01 Digital Alarm #1 Activated CNT 130 The digital alarm has been activated.
#01 Sidewall Inlet #1 Out of Position The position sensor is reporting a device position that is different than what the controller expected based on the device's Open and Close times.
#01 HUMIDITY STA#01 CH#03 CNT 12 VALC17C The humidity sensor is giving an invalid reading.

Error Detail

The Error Detail is an activity log for the alarm records. Alarm detail is displayed only when no passwords are set up for the controller, or the user has a level 3 password.

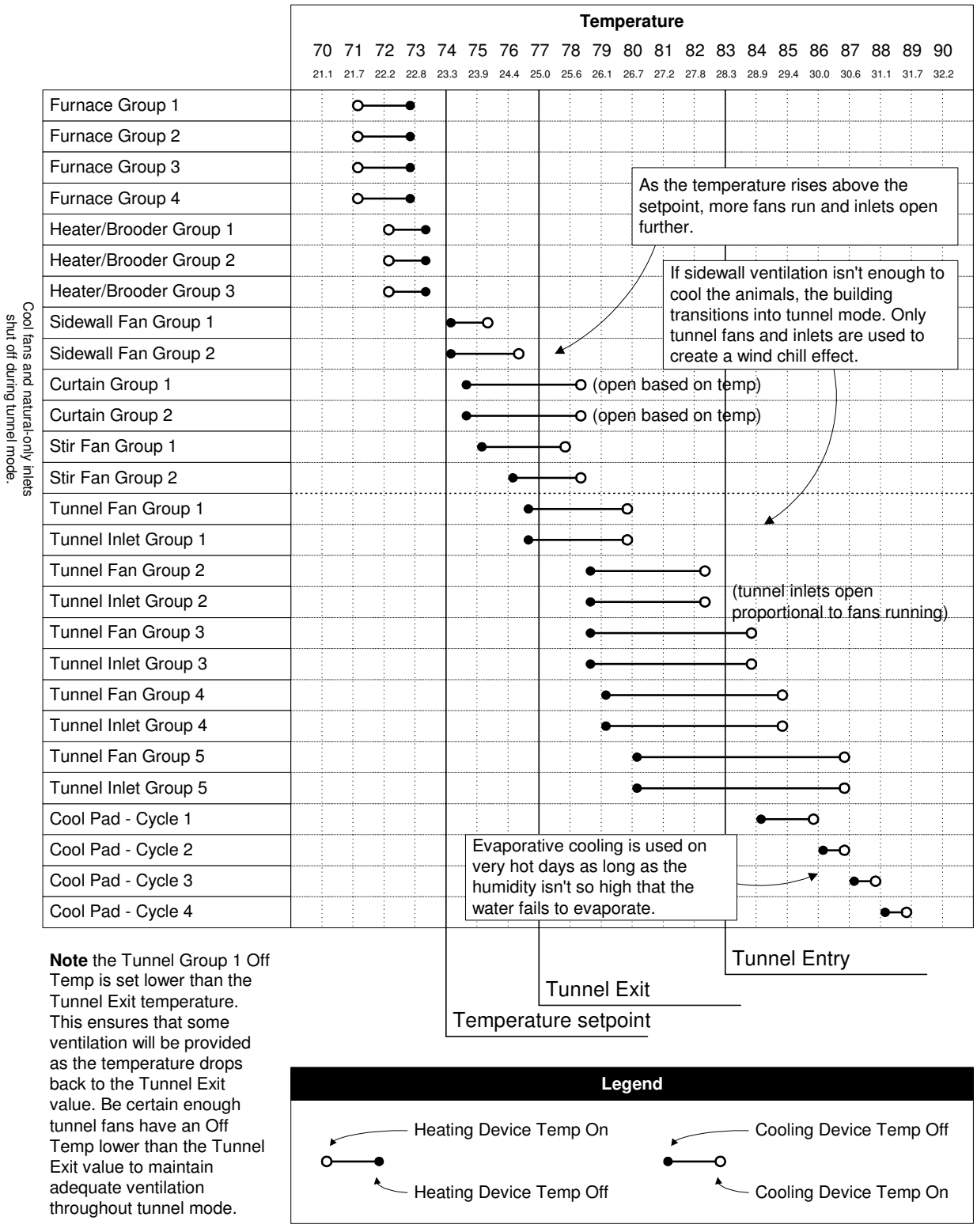
```
ERROR DETAIL ON 12/20 AT 11:23:41
```

Information from an alarm record is saved in the error detail under any of the following conditions:

- On the first occurrence of any error or alarm condition.
- On the first occurrence during the current hour.
- When the occurrence of an error causes it to be an active alarm.
- When you manually clear an active alarm.
- When the active alarm is cleared by the system because the error condition (High Temp, Feeder OFF time, etc.) no longer exists.

Appendix A

Progressive Heating and Cooling Example



Note the Tunnel Group 1 Off Temp is set lower than the Tunnel Exit temperature. This ensures that some ventilation will be provided as the temperature drops back to the Tunnel Exit value. Be certain enough tunnel fans have an Off Temp lower than the Tunnel Exit value to maintain adequate ventilation throughout tunnel mode.

Sample Device Setpoints.vsd

Appendix B

Curtain and Inlet Behavior

Device	Mode Assigned to Device	Behavior During:	
		Natural Mode	Tunnel Mode
Curtain 	Static Tunnel Only	Closed.	Operates based on static pressure.
	Temp Natural Only	Operates based on the device's Opening Temp and Closing Temp.	Closed.
	Static Natural Only	Operates based on static pressure.	Closed.
	Temp Natural/Temp Tunnel	Operates based on the device's Opening Temp and Closing Temp.	Operates based on proportional control
	Temp Natural/Static Tunnel	Operates based on the device's Opening Temp and Closing Temp.	Operates based on static pressure.
	Temp Tunnel Only	Closed.	Operates based on proportional control
	Static Natural/Temp Tunnel	Operates based on static pressure.	Operates based on proportional control
	Static Natural/Static Tunnel	Operates based on static pressure.	Operates based on static pressure.
Inlet 	Static Tunnel Only	Closed.	Operates based on static pressure.
	Temp Natural Only	Operates based on proportional control.	Closed.
	Static Natural Only	Operates based on static pressure.	Closed.
	Temp Natural/Temp Tunnel	Operates based on proportional control	Operates based on proportional control
	Temp Natural/Static Tunnel	Operates based on proportional control	Operates based on static pressure.
	Temp Tunnel Only	Closed.	Operates based on proportional control
	Static Natural/Temp Tunnel	Operates based on static pressure.	Operates based on proportional control
	Static Natural/Static Tunnel	Operates based on static pressure.	Operates based on static pressure.

Operates based on static pressure - A static pressure sensor monitors negative static pressure inside the building and adjusts the inlet or curtain based on your static pressure Setpoint, Open and Close settings (Static Pressure menu).

Operates based on proportional control - The controller monitors the number of fan groups designated for proportional control that are running. The curtain or inlet is adjusted according to this number and the settings you enter in the device's Fan Groups On \ Opening Size menu.

Operating Modes Summary.vsd

Service

For assistance, make sure you have checked the parameters in the controller and have reviewed the appropriate sections of this manual, and the Troubleshooting section in the Installation Manual.

If you still need assistance, contact:

VAL-CO Service Department

145 Jackson Avenue South

Cokato, MN 55321

Phone: (320) 286-0109

Fax: (320) 286-2104

Fuse Ratings

- Power Supply Input: 2.5 Amp 250VAC (5 x 20 mm) fast-acting interrupting type (Littelfuse® 216 02.5 or equivalent)
- Output Channel: 20 Amp 3AB ceramic body slow-acting type (Bussmann® MDA-20 or equivalent 0.25 x 1.25”)

User Manual Addendum

The Controller Software Version 5.03 includes a number of changes, enhancements, and additional features. Some of these only apply to a specific device, while others affect zone-level or system-wide operation.

System Changes:

Dual Languages: The controller's support for dual languages is now built directly into the software. Just go to any non-edit menu and press both the "+" and "-" keys at the same time. The display menus will switch back and forth between English and Spanish.

Expansion Module Addressing (*1600/3200 only*): Adding a device to this controller will now require the operator to specify both the Station number and the Channel number. This allows the traditional expansion modules to be added to these controllers. Note that Station number 1 is used for devices wired to the main controller. Station numbers 2-4 are allocated to internal operations. Any expansion modules would be assigned to Station numbers 5 and up.

Security Settings: The system security levels have been modified. There is a new level (level 9) that is only available to a service technician. New features available to the service technician are discussed later. The default level, with no passwords entered, will now be level 7. This takes the place of level 4 in previous versions. In addition, previous levels 1-3 are changed to 2-4. The new level one use is allowed to change the SetPoint temperature and the Ramping Offset (if the zone is ramping).

Zone-Level Changes:

RH Sensors: Each zone may now have up to 3 RH sensors installed. The RH displayed will be the average of the installed sensors.

Minimum Vent Ramping: A ramping table has been added for Minimum Ventilation. It is similar to the temperature setpoint ramping. The ramp table includes Age, ON Timer, and OFF Timer. During Min Vent, the ON and OFF timers are calculated from the table based on the current animal age.

Tunnel Entry Inhibit: There is a zone-level temperature control that prevents the zone from entering Tunnel Mode if the outside temperature is below the setting.

Static Pressure Set Point: Each zone now has two set points for static pressure: One for Natural ventilation and one for Tunnel ventilation. Note that only the Natural mode set point will be ramped. Also note that the static pressure ramp table has been updated from 3 set points to 5 set points.

Static Pressure Alarm: This alarm has been updated to add a setting to optionally open all inlets to maximum position when the High Static Pressure alarm is active.

Device-Level Changes:

Curtain Max Opening Size: Each curtain device now has a setting for Maximum Opening Size. There is also a new setting for Override Temperature. If the control temperature for this device exceeds this temperature, the Maximum Opening Size setting will be ignored, and the device will be allowed to reach its full opening size.

Inlet Out of Position Percent: Each position sensor can be considered "out of position" between 0.1% and 10.0% based on this new setting. It is a percent of the total opening size. This setting determines when the Out of Position alarm is activated. *Upgrade note*: When performing the FLASH upgrade from V5.0 to V5.03, change the Out of Position Alarm setting to YES with the original V5.0 software installed. This will prevent the alarm from being enabled using the new setting in V5.03.

Position Sensor Calibration: This function has been enhanced to show the current status of the calibration process. Note that the controller now only allows the position sensors to be calibrated one at a time. *Upgrade note*: After performing the FLASH upgrade to V5.03, It will be necessary to recalibrate all position sensors.

Service Technician Features:

The new service technician security level allows access to additional menus that support the following functions:

Zone Copy: This allows the technician or operator to set up all the devices and parameters in a zone, and then copy all those devices and their settings to another zone.

Expansion Module Disable: This setting will cause the controller to stop attempting to communicate with the specified Station number (not allowed for Station Number 1). This is a temporary setting useful for servicing or troubleshooting the system. Once power is reset, all Stations will be enabled.